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AIR POLLUTION ASPECTS OF EMISSION SOURCES: PETROLEUM REFINERIES. A BIBLIOGRAPHY WITH ABSTRACTS

Environmental Protection Agency
Research Triangle Park, North Carolina

July 1972

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Air Pollution Technical Information Center

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ENVIRONMENTAL PROTECTION AGENCY
Office of Air Programs
Research Triangle Park, North Carolina
July 1972

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AIR POLLUTION ASPECTS OF EMISSION SOURCES: PETROLEUM REFINERIES — A BIBLIOGRAPHY WITH ABSTRACTS

INTRODUCTION

Petroleum refineries contribute significantly to the overall air pollution level in the United States. To aid efforts to improve air quality, the Air Pollution Technical Information Center (APTIC) has compiled this bibliography relevant to the problem and its solution.

The abstracts included have been selectively screened from the contents of APTIC's information storage and retrieval system to cover the 14 categories set forth in the table of contents. The compilation is intended to be representative of available literature, and no claim is made to all-inclusiveness.

Subject and author indexes refer to the abstracts by category letter and APTIC accession number. Generally, higher accession numbers, representing the latest acquisitions, cover the most recent material.

All documents abstracted herein are currently on file at the Air Pollution Technical Information Center, Environmental Protection Agency, Research Triangle Park, North Carolina 27711. Readers outside the Environmental Protection Agency may seek duplicates of documents directly from libraries, publishers, or authors.

A. EMISSION SOURCES

01838

T. D. Nevens and F. A. Rohrman

GASEOUS AND PARTICULATE EMISSIONS FROM SHALE OIL OPERATIONS. Preprint. (Presented at the American Chemical Society Meeting, Pittsburgh, Pa., 1966.)

World-wide and domestic demands for hydrocarbons tend to seek the most economical and convenient sources for potential exploitation. It has been said that the oil shale deposits of the world constitute many times the total of the world's reserves of liquid petroleum. The vast shale oil industry is nearly upon us as the problems of finding new economical sources of liquid petroleum are becoming more acute. The next 5 or 10 years could see the emergence of shale oil industry producing a million or more barrels a day in this small area of the Rocky Mountains. Any ripples of unfavorable prices on imported crude or finished products could cause abrupt waves of decision as to the tim e of arrival of this industry. It is hoped that all operations involving a future shale oil industry will take cognizance of the potential air pollution problem. To disregard air pollution at the early stages of development may require later intensive and extensive engineering at a much higher cost.

03154

N. E. Flynn and W. R. Crouse

REPORT ON NITROGEN OXIDES IN THE BAY AREA AIR POLLUTION CONTROL DISTRICT. Preprint. 1964.

Total oxides of nitrogen (NOx) emissions in the Bay Area Air Pollution Control District for 1963 are estimated at 515 tons/day. A summation of emissions of oxides of nitrogen by general source categories is presented. Transportation at 323 tons/day is the major source category of nitrogen oxides emissions and accounts for 63% of all oxides of nitrogen emissions for the Bay Area. Combustion operations at 150 tons/day are the second largest source category and contribute 29% of the nitrogen oxides emissions. Emissions from small, medium, and large stationary sources with incinerations, agriculture, and transpotation sources grouped separately, are presented. (Author summary modified)

03420

A. H. Rose, Jr., H. H. Black, R.C. Wanta

AIR AND WATER POLLUTION STUDIES RELATED TO PROPOSED PETROLEUM REFINERY FOR SAND ISLAND - OAHU, TERRITORY OF HAWAII (¼REPORT TO BOARD OF HEALTH, TERRITORY OF HAWAII). Public Health Service, Cincinnati, Ohio, Div. of Air Pollution. Dec. 1955. 60 pp. HEW

The objective of the atmospheric pollution phase of this study was na evaluation of the possible effect on the atmosphere of the City of Honolulu which may result from the operation of a 24,000-barrel-per-day modern fluid catalytic cracking refinery. Two factors were investigated, first the extent and causes of the current atmospheric pollution level, and second the potential impact on the pollution level which may result from the refinery operation. Process design for the proposed refinery was tentative in that only process flow and major process units were fixed; interflow of components between process units and their elements had not been finalized. Data covering the operation of and atmospheric contaminant discharge from existing industrial operations were relatively meager. Data on the concentrations of specific contaminants in the Honolulu atmosphere were not available. Only published climatological data were available . The quantity of specific atmospheric contaminants from both existing sources and the proposed refinery are presented as determined from the best available data.

03871

L. B. Hitchcock

AIR POLLUTION AND THE OIL INDUSTRY. Proc. Am. Petrol. Inst., Sect. IV. 35, 150-4, 1955. (Presented at the spring meeting, Pacific Coast District, American Petroleum Inst. Division of Production, Los Angeles, Calif., Apr. 28, 1955.)

While most of Los Angeles' air pollution is traceable to petroleum products, by far the largest share arises from the use to which these products are put. Motor-vehicle exhaust accounts for the largest single source of pollution. Fuel oil and gas also contribute. Incineration of refuse and metallurgical and miscellaneous industrial emissions account for most of the balance. The public, through its motor vehicles and rubbish burning, contributes more than half the total pollution. The oil industry, indispensable to the community's growth, has done more than all the rest of the area in developing and adopting corrective measures, and has reduced its emissions very substantially. Petroleum production in Los Angeles County contributes a very minor part to air pollution. Hydrocarbons and nitrogen oxides in combination produce smog effects, although neither alone, at concentrations found, is known to be deleterious. Cleaner air costs money, but less than smog. Intevsive application of science and engineering to the overall problem is the only road to success. (Author abstract)

04026l

Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control. Jan. 1967. 21 pp.

SURVEY OF AIR POLLUTION SOURCES IN SIXTY-NINE STANDARD METROPOLITAN STATISTICAL AREAS WITH EMPHASIS ON SULFUR DIOXIDE EMISSIONS .

This survey presents estimates of a number of parameters that contribute to an area's air pollution problems. The Standard Metropolitan Statistical Area (SMSA) was selected as the unit of study. The parameters presented here are consumption of fuels, sales of gasoline, and production of steel, petroleum, and cement. The method used to estimate the various parameters is an abbreviated form of the Ozolins-Smith technique. Further investigation is planned with a view toward reliably predicting sulfur pollution problems from emission estimates based on community parameters.

04345

D. D. Wangerin

WASTE-HEAT BOILERS - PRINCIPLES AND APPLICATIONS. Proc. Am. Power Conf. (Presented at the 26th Annual Meeting, American Power Conference, Chicago, Ill., Apr. 14-16, 1964.) 26, 682-91, Apr. 1964.

The special problems which the waste-heat boiler designer encounters are reviewed. Some of the more recent improvements in the utilization of waste by-products for steam generation are illustrated. The types of waste-heat boilers available are discussed. The discussion is limited to the utilization of the principal waste products available in three major industries - pulp and paper, steel, and petroleum. All of the waste fuels considered have characteristics that require special equipment-design considerations. Waste fuels are extremely poor when compared with the usual prime fuels. Many byproduct fuel or waste gases contain sufficient heat energy to make it economically feasible to generate steam for power and process use. Each waste fuel has a different characteristic, requiring a boiler of special design. But, all have very low heating values when compared with the usual prime fuels. In many cases, multiple-fuel-fired boilers can be designed to dispose of the waste product while minimizing the burning of the prime fuels. So, with cost of prime fuels steadily rising over the years, waste products are more and more harnessed to provide part of industry's steam demands.

04785

D. A. Kendall and A. J. Neilson

ODOR PROFILE STUDIES OF EFFLUENT WASTE WATERS FROM SEVEN REFINERIES. Proc. Am. Petrol. Inst. 44, (Sec. 3) 62-7, 1964. (Presented before a Session on Controlling Refinery Wastes, 29th Midyear Meeting, American Petroleum Inst. Division of Refining, St. Louis, Mo., May 11, 1964.)

Currently odor measurement must rely on human sensory analysis as there are no instruments which have a comparable response or sensitivity. In many instances, chemical analyses and instrumental techniques can provide supporting information which is helpful in expanding, confirming, and interpreting subjective odor data. The human nose is an extremely convenient and useful instrument in providing both qualitative and quantitative information about odor, if, as is done by the odor profile method, adequate controls are exercised in presenting samples and in carrying out the analyses, and appropriate external reference standards are used. In profiling effluent wastes from a variety of refineries operating on various types of crude oil and with various treating facilities, in general, the effluents from the API gravity separator are quite similar in odor components, and in strength of odor generally fall within a range of a factor of 10 in threshold odor number. Each refinery appears to have specific odor characteristics by which it can be identified, as well as minor variations in the odor character from day to day or even hour to hour.

05005

R. P. Hangebrauck, D. J. von Lehmden, and J. E. Meeker

SOURCES OF POLYNUCLEAR HYDROCARBONS IN THE ATMOSPHERE. Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control. (PHS Publ. No. 999-AP-33.) 1967. 48 pp.

Rates of emissions of polynuclear hydrocarbons were measured at several sources considered likely to produce such emissions. The sources included heat generation by combustion of coal, oil, and gas; refuse burning; industrial processes; and motor vehicles. The annual emissions of benzo(a)pyrene in the United States were estimated for each of the sources surveyed, to provide a rough gauge of the importance of each source. Small, inefficient residential coal-fired furnaces appear to be a prime source of polynuclear hydrocarbons; other sources may be of local importance. Production of polynuclear hydrocarbons was generally associated with conditions of incomplete combustion. (Author abstract)

07623

Larson, Gordon P., John C. Chipman, and Erwin K. Kauper

DISTRIBUTION AND EFFECTS OF AUTOMOTIVE EXHAUST GASES IN LOS ANGELES. In: Vehicle Emissions, SAE Tech. Progress Series, Vol. 6, Society of Automotive Engineers, New York, 1964. p. 7-16. 12 refs. (Presented at the Annual Meeting, Society of Automotive Engineers, Jan. 1955)

Hydrocarbons or gasoline vapors are known to be an important factor in producing several of the deleterious effects of smog, however, one question to be answered is whether or not the removal of hydrocarbons from all other sources in the community would relieve the burden on the air sufficiently to avoid any control measures on auto exhaust. The measurements of the quantity of hydrocarbons emitted by internal combustion engines another source of hydrocarbons contributing to the buildup were explored. The areas of exhaust gas concentration buildup were determined by a study of Los Angeles traffic. Studies now clearly show that removal of all other sources of hydrocarbons from refineries and from the distribution of gasoline will not lower the concentration of hydrocarbons in downtown Los Angeles area and the north-central section of the County sufficiently to relieve the eye irritation, crop damage effects, and high ozone content of the air in those areas. The Air Pollution Control District recommends that engineering studies seeking to remove hydrocarbon vapors from exhaust gases should strive for a 90% overall removal under conditions of operation experienced in heavy traffic.

07963

Rohrman, F. A., B. J. Steigerwald, and J. H. Ludwig

POWER PLANT AND OTHER SULFUR DIOXIDE EMISSIONS; 1940-2000. Preprint, Public Health Service, Cincinnati, Ohio, Division of Air Pollution, ((13))p., ((1965)). 21 refs.

Major sources, potential sources, estimated annual emissions and the effects of probable control efforts of Sulfur Dioxide to the year 2000 are discussed. The major sources include power plant operation (coal and oil); other combustion of coal; combustion of petroleum products (excluding power plant oil; wmelting of ores; petroleum refinery operation; coke processing; sulfuric acid plants; coal refuse banks; and refuse incineration). Annual emission of Sulfur Dioxide is 76.0 million tons. To indicate a range of estimated future sulfur dioxide emissions, two control schedules were selected for application to the major sources of SO2 from the current year to the year 2000. Maximum SO2 emissions will probably occur between 1975 and 1985 for the range of control schemes postulated.

08393

John M. Ryan

UTILIZATION OF PETROLEUM AND PETROLEUM PRODUCTS. Am. Chem. Soc., Pittsburg, Pa., Div. Fuel Chem., Preprints, 9(2):223-230, 1965. 6 refs. (Presented at the 149th National Meeting, American Chemical Society, Division of Fuel Chemistry, Symposium on Fuel and Energy Economics, Detroit, Mich., April 4-9, 1965.)

In discussing utilization of petroleum, the existing or potential technology of oil consumption must be considered, also the effects of potential changes in supply and of new competitive forces. The demand for petroleum products in the U. S. will probably grow at a rate of 2 or 3 per cent a year. Abroad the annual growth rate will be perhaps twice as great as the rate in the U. S. 50% of all the oil consumed in the U. S. is used in the transportation sector. The growth rate will be limited by the growth of the market. General industry and power plant use constitute a second market, accounting for 7% of steam and electric power plant fuel, and 13% of the manufacturers' heat and power market. Another major market is residential and commercial consumption in which oil supplies about one third of the total energy consumed. Resources will not be a limiting factor either in the U. S. or the free world and there should be no significant shift in relative fuel prices in the foreseeable future. It is unlikely that oil demand will be increased appreciably in the U. S. through research in utilization. Research on improved exploratory and productive techniques will probably have a greater influence on domestic oil demand than will research on oil utilization. The changes in oil utilization which appear most probable will not alter the growth rate of oil demand in the Y.S. so much as its composition. Finally, some research is being conducted today on the supposition that crude oil is in limited supply and hence that refined product prices are likely to rise in the near future relative to prices of competing fuels.

08524

Kapkaer, E. A., L. V. Trofimova, N. A. Evikeeva, and A. K. Monkevich

HYGIENIC EVALUATION OF SOME PETROCHEMICAL INDISTRIES. ((Gigienicheskaya otsenka nekotorykh neftekhimiches- kykh proizvodstv.)) Text in Russian. Gigiena Truda i Prof. Zabolevaniya (Moscow), 10(11):22-28, Nov. 1966. 10 refs.

Deficiencies in planning and actual operation of petrochemical plants are responsible for the discharge of acetylene, polyethylene, phenol, acetone, methylstyrene, isoprene, divinyl and other toxic complexes which are products of decomposition, oxidation, and hydrolysis. Desorption of toxic substances from construction materials (concrete brick) plays an important part. The authors recommend methods for improving working conditions in petrochemical production facilities. (Authors summary, modified)

08701

GIANT STACK WILL VENT SULFUR OXIDES ABOVE SMOG CEILING. Chem. Eng., 74(17):104, Aug. 14, 1967.

A 800 ft. smoke stack at a pertoleum refinery in The Netherlands that will discharge sulfur-bearing flue gases is described. The structure will conduct the sulfurous flue gases to above the meteorological inversion layers that often form and act as a ceiling for the atmospheric layer below.

09298

Holland, H. R.

A REVIEW OF PROBLEMS AND PROGRESS IN THE CONTROL OF POLLUTION IN THE OIL REFINING INDUSTRY IN CANADA. In: Pollution and Our Environment: Conference Background Papers, Vol. 2, Montreal, Canadian Council of Resource Ministers, Paper B18-5, p. 1-18, Jan. 1967. 6 refs. (Presented at the National Conference, Canadian Council of Resource Ministers, Montreal, Oct. 31-Nov. 4, 1966.)

The available techniques for controlling potential pollution in the production, refining, and distribution of petroleum products are outlined. Generally, these are adequate to meet present and immediately predictable objectives of environmental cleanliness. Development of better and cheaper processes will be required to meet future requirements efficiently. Control processes which have proved satisfactory in practice are listed but there is no attempt to specify the optimum combination or sequence of treatment for any specific situation. Methods are outlined for the following pollutants: sulphur oxides, hydrogen sulphide and mercaptans; carbon monoxide; other fuel odours; light hydrocarbons; nitrogen oxides; particulate matter; and volatile acids.

09686

R. L. Duprey

COMPILATION OF AIR POLLUTANT EMISSION FACTORS. Public Health Service, Durham, N. C., National Center for Air Pollution Control, Publication No. 999-AP-42, 67p., 1968. 126 refs.

Detailed emission factors are given for the following processes and industries: fuel combustion, refuse incineration, chemicals, food and agriculture, metallurgical refining, minerals, petroleum, pulp and paper solvent evaporation and gasoline marketing, and transportation (vehicle emissions).

09737

Ozolins, G. and C. Behmann

AIR POLLUTANT EMISSION INVENTORY OF NORTHWEST INDIANA. (A PRELIM- INARY SURVEY, 1966.) Public Health Service, Durham, N. C., National Center for Air Pollution Control, APTD-68-4, 36p., April 1968.

Sources of air pollutant emissions were surveyed to quantify the total pollution load emitted to the air over the Northwest Indiana communities of East Chicago, Gary, Hammond, and Whiting. The emissions are reported on an annual basis and subdivided into the five major pollutants: particulates, sulfur oxides, nitrogen oxides, hydrocarbons, and carbon monoxide. The four major source catagories that were utilized in reporting emissions from area and point sources are: fuel combustion in stationary sources, fuel combustion in mobile sources, combustion of refuse, and industrial process losses. The results of this survey are reported by city and illustrated on the grid system established by the Northwest Indiana Air Resource Management Program. (Authors' abstract)

09785

Dickinson, Janet, Robert L. Chass, and W. J. Hamming

AIR CONTAMINANTS. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 11-21, 1967. GPO: 806-614-30

The parameters of an air pollution problem, particularly the problem in Los Angeles County; the measures taken to eliminate the problem; and control measures still needed are described. The air contaminants include: organic gases (hydrocarbons, hydrocarbon derivatives); inorganic gases (NOx, SOx, CO); miscellaneous inorganic gases (NH3, H2S, Cl2, F2); particulates (carbon or soot particles, metallic oxides and salts, oily or tarry droplets, acid droplets, metallic fumes). Each is discussed indicating the sources and significance in the air pollution problem.

12299

Samoilovich, L. N. and Yu. R. Red'Kin

AIR POLLUTION WITH 3,4-BENZPYRENE BY PETROCHEMICAL ENTERPRISES. (Zagryaznenie atmosfernogo vozdukha 3,4-benzpirenom predpriyatiyami neftekhimicheskoi promyshlennosti). Hyg. Sanit., 33(7-9):320-325, July-Sept. 1968. 7 refs.

Air quality measurements were made in the vicinity of an oil-chemical industrial complex to determine 3,4-benzpyrene concentrations, as measured by fluorescence spectroscopy. Over a three-year period, 210 analyses were performed. A 3,4-benzpyrene pollution of 0.15 - 2.2 mkg/100 cu m was found within a 2-km radius of the plants. The heaviest pollution came from the coking and pyrolysis shops. The experimental data are applicable to the determination of required width of the sanitary-protective zone around petroleum processing plants.

13699

MacDonald, H. E.

FLUORIDE AS AIR POLLUTANT. Fluoride Quarterly, J. Intern. Soc. Fluoride Res., 2(1):4-12, Jan. 1969. 31 refs.

Fluoride compounds reach the air from two sources: volcanic action and man's industrial activities. The two greatest acute air pollution episodes occurred in Belgium's Meuse Valley and in Donora, Pa. In both disasters, there was evidence of acute fluoride poisoning. The sources of industrial fluoride pollution are coal, clay, cryolite, fluorspar, hydrogen fluoride, and phosphate rock. About half the bituminous coal consumption in the United States for 1963 was utilized by electric power utilities. Vegetation in several counties in California has been adversely affected by fluoride emissions from brick, tile, and pottery factories. Cryolite, used in the production of aluminum, has been traced as a source of damage to vegetation, livestock, and human health. Fluorspar and hydrogen fluoride are used in steel production, and the latter is also used in the production of high-octane gasoline. Many cases of eye irritation were recorded shortly after a Los Angeles refinery began using hydrogen fluoride. Fluoride emissions from the production of phosphate fertilizer, phosphoric acid, and phosphorus have been responsible for damage to vegetation and livestock, and respiratory ailments in people. Control of fluoride emission may be achieved by a variety of scrubbers and electrostatic precipitators.

17199

Oshio, Toshiki

AIR POLLUTION PROBLEMS IN JAPAN (I). (Wagakuni ni okeru taiki osen to sono mondaiten (I)). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 4(4):197-208, April 15, 1968.

It is known that air pollution grows more serious where various types of industries are concentrated in one area. The coastal industrial area in Japan is typical in this respect: the recent tendency of plants to locate on, or adjacent to the coastline is particularly reflected in locations of petroleum refineries and petrochemical plants associated with iron and steel refineries or with thermal power plants for whom coastal areas provide shipping advantages. The difficulty of shoreline air pollution control lies in the diversity of industries involved. Factors associated with different pollutants generated by individual plants must be investigated to determine the collective effect of combined pollutants. For example, where heavy oil is burned, the determination of the air-pollution load in the immediate area is based on multiple density, which is the product of the total quantity of exhaust gas emission and respective density of each pollutant. In addition, several major types of effects of the concentration of air pollutants after they leave emission sources should be taken into consideration. Dispersion of pollutants depend on the effective emission height of the chimney, efflux velocity, wind speed, and other geographical conditions which complicate the behavior of atmospheric pollutants in coastline areas. The major sources of sulfurous gases are the thermal power plants, iron-steel refineries, petroleum refineries and petro chemical plants, but there are additional pollutants which make the pollution density thicker. Since sulfurous gas alone may be less important in qualitative and quantitative respects, other combustion products, such as metal sulfides or sulfates generated in iron-steel plants, need to be considered in shoreline pollution abatement programs.

17603

Miner, Sydney

PRELIMINARY AIR POLLUTION SURVEY OF HYDROGEN SULFIDE. A LITERATURE REVIEW. Litton Systems, Inc., Silver Spring, Md., Environmental Systems Div., Contract PH 22-68-25, NAPCA Pub. APTD 69-37, 91p., Oct. 1969. 148 refs. CFSTI: PB 188068

The literature on effects, sources, abatement, economics, and methods of analysis of atmospheric hydrogen sulfide is reviewed, with an appendix of tabular material from selected references. Hydrogen sulfide gas is very toxic to humans and at concentrations over 1,000,000 micrograms/cu m, quickly causes death by paralysis of the respiratory tract. At lower concentrations, it has an obnoxious odor and causes conjunctivitis with reddening and lachrymal secretion, respiratory tract irritation, pulmonary edema, damage to heart muscle, psychic changes, disturbed equilibrium, nerve paralysis, spasms, unconsciousness, and circulatory collapse. It also tarnishes silver and copper and combines with heavy metals in paints to discolor or darken the paint surface. The primary natural sources of H2S is biological decay of protein material in stagnant water. Among the many industrial sources are kraft paper mills, oil refineries, natural gas plants, and chemical plants, as well as sewage and sewage disposal plants. Average concentrations of H2S in urban atmospheres range from 1-92 micrograms/cu m. Emissions can be controlled by black liquor oxidation systems, scrubbers, and incineration devices. Hydrogen sulfide corrosion of silver has required substitution of gold contacts in electrical appliances at an estimated increased cost of $14.8 million during 1963. Abatement of air pollution from the pulp and paper industry, in which H2S is a major factor, has cost approximately $10 million per year and is predicted to increase. Major expenditures have been made by refineries and natural gas plants to remove H2S from sour gases and to recover sulfur as a valuable byproduct. Analytical techniques based on the methylene blue and molybdenum blue methods are available for laboratory analysis of H2S. The spot method, based on tiles or paper impregnated with lead acetate, is also widely used. (Author abstrac modified)

17604

Stahl, Quade R.

PRELIMINARY AIR POLLUTION SURVEY OF SELENIUM AND ITS COMPOUNDS. A LITERATURE REVIEW. Litton Systems, Inc., Silver Spring, Md., Environmental Systems Div., Contract PH 22-68-25, NAPCA Pub. APTD 69-47, 76p., Oct. 1969. 135 refs. CFSTI: PB 188077

The literature on the human and animal effects, sources, abatement, economics, and methods of analysis of selenium and its compounds as air pollutants is reviewed, with an appendix of tabular material from selected references. Selenium

compounds in the atmosphere are known to cause irritation of the eyes, nose, throat, and respiratory tract in humans, and, under conditions of prolonged exposure, gastrointestinal disorders. In animals, there are indications that selenium ingestion may cause cancer of the liver, and it is known to produce pneumonia and degeneration of liver and kidneys. Although no studies were found on the effects of atmospheric selenium on plants, species which are classed as primary indicators or secondary selenium absorbers are discussed. Sources of atmospheric selenium include combustion of industrial and residential fuels, refinery waste gases and fumes, and incineration of wastes including paper products which contains as much as 6 ppm selenium. Little data is available on concentrations of selenium in the air; one report indicated an average value of 0.001 microgram/cu m in the vicinity of Boston, Mass. Electrostatic precipitators and water scrubbers are effective in controlling emissions of selenium in industrial operations. No information has been found on the economic costs of selenium air pollution, or on the costs of its abatement. Methods are available for the analysis of selenium in the atmosphere, including neutron activation analysis and colorimetry. (Author abstract modified)

20553

Sullivan, Ralph J.

PRELIMINARY AIR POLLUTION SURVEY OF ODOROUS COMPOUNDS. A LITERATURE REVIEW. Litton Systems, Inc., Silver Spring, Md., Environmental Systems Div., Contract PH 22-68-25, NAPCA Pub. APTP 66-42, 244p., Oct. 1969. 443 refs. CFSTI: PB 188089

Odors may cause mental and physiological effects in humans, such as nausea, headache, loss of sleep, loss of appetite, impaired breathing, and in some cases allergic reactions. Community and personal pride and status may be adversely affected. No information on the effect of odorous air pollutants on the health or behavior of domestic, commercial, or experimental animals was found in the literature. The petroleum industry, petrochemical plant complexes, chemical industry, pulp and paper mills, coke ovens, coal, iron-steel industry and foundries, food processing, meat industry (including livestock slaughtering, inedible rendering of animal matter, fish processing, tanneries, etc), combustion processes (including diesel engines), and sewage are listed as sources of odors. The literature contains no quantitative data on the odor concentration in ambient air. Surveys have been made, but they show only the detective disagreeable odors and not their intensity. Abatement methods fall into several categories: combustion, absorption, adsorption, odor masking, odor removal, chemical control, biological control, and containment. Combustion is generally accepted as the best way to deodorize malodorous gases. Oxidation at 1,200 F or above usually gives satisfactory results. Economically, odor pollution depresses property values. The human nose is the only reliable detector, and several laboratory and field methods (organoleptic methods, such as the vapor dilution technique and the syringe dilution techinque) and instrumental methods (such as gas chromatography) have been deveolped to quantify human observations.

23745

Devorkin, Howard and Bernard J. Steigerwald

EMISSIONS OF AIR CONTAMINANTS FROM BOILERS AND PROCESS HEATERS. Los Angeles County Air Pollution Control District, Calif., California Dept. of Public Health, Berkeley, Public Health Services Washington, D. C., Community Air Pollution Program, Western Oil and Gas Assoc., Los Angeles, Calif., Air Pollution Control Committee, Rept. 7, 29p., June 1958. 9 refs.

Combustion of fuel oil and gas is a source of emissions to the atmosphere. The techniques and results of a stack sampling study to determine the extent of these emissions from combustion in oil refinery boilers and heaters in Los Angeles County are presented. A total of 21 stacks were sampled, using standard sampling procedures and methods. The results were evaluated in the form of total emissions and average emission factors. The average emission factors per unit of fuel used were calculated for each contaminant for combustion of both oil and gas. The contaminants measured include hydrocarbons, as hexane; sulfur dioxide; oxides of nitrogen, as nitrogen dioxide; particulate matter; sulfur trioxide; ammonia; aldehydes; and organic acids, as ascetic acid. Emissions of sulfur oxides are a direct function of the composition of the fuel, while the emission of the other contaminants are primarily influenced by combustion temperature, heater design, or air-fuel ratio rather than fuel composition. Comparison of the analysis of stack gases for SO3 with the measured SO2 emissions from these units gave an average ratio of SO3 to total sulfur as SO2 of 0.03. Of the 20 tests made for CO 14 were negative, five showed a trace less than 0.001%, and one showed a concentration of 0.003%; the emission of CO from boilers and process heaters was negligible.

23865

Mammarella, Luigi

EVALUATION OF POLLUTION EMISSIONS IN ITALY. (Valutazione delle effluenze inquinanti in Italia). Text in Italian. In: L'inquinamento atmosferico in Italia. Rept. 27, p. 70-95, 1970. 110 refs.

An attempt is made to estimate the development of the pollution problem in the near future on the basis of current statistics. Figures are given on the responsibility of the main sources of pollution for the various types of pollutants found in the atmosphere. The emission of materials related to air pollution is given for six of the main industrial sources and for 4 types of fuel used. Meteorological conditions are summarized for 7 important areas of Italy: Turin, Milan, Venice, Bologna, Rome, Naples and Taranto. This is correlated with the consumption of fuel oil and gasoline, and a hypothesis is worked out for predicting possible pollution levels up to the year 1980. It is estimated that in the period 1970-1980, one could expect an average annual increase for all types of pollutants of 6.7%.

23881

Mammarella, Luigi

PRINCIPLE SOURCES OF POLLUTION. (Le principali fonti di inquinamento). Text in Italian. In: L'Inquinamento atmosferico i Italia. Rept. 27, p. 7-145, 1970. 110 refs.

Air pollution sources are summarized under the headings of home heating, industrial sources (cement industry, thermoelectric plants, petroleum industry, metallurgical plants, chemical industries), and motor traffic. Due to the frequent occurrence of inversions in the Milan area, the sulfur dioxide concentration in the lower layers of the atmosphere itensify as one reaches the center of the city, where the average monthly figures reach 0.4 ppm, with occasional values above 1.5 ppm., which is experienced with more frequency than in Paris or London. At Turin, the values range between 0.2 and 0.4 ppm in the winter, while the summer value is 0.01. The concentrations at Padua are in the range of 0.4 - 0.2 ppm. Concentrations at Rome during the winter are in the range 0.07-0.1 ppm, while at Salano there is practically no SO2 in the air at any time of the year. Italy has 120 cement plants, with a heavy concentration in the Po Valley. There are 347 thermoelectric plants, ranging in output from 1 MW to 600 MW. Figures for 1967 give 38 petroleum refineries with a total capacity of more

than 140 million tons. An estimate based on parallel statistics from the USA gives a figure of 86 million tons of pollution created by automotive traffic in the year 1966, which would constitute about 60% of total emissions.

24370

Stuewe, A. Howard

HYDROGEN FLUORIDE: WHERE IT GOES, HOW IT'S MADE, WHY IT'S GROWING. Chem. Eng. News., vol. 36:34-38, 57, Dec. 22, 1958.

Consumption of hydrogen fluoride is expected to reach 215,000 tons in 1963. Grouped under four major categories, the principal market for HF are primary aluminum production, fluorocarbons (refrigerants aerosols), uranium production, and petroleum alkylation (in the production of high octane blending components for gasoline). All HF production is dependent on the reaction of sulfuric acid with fluorspar, domestic reserves of which could become exhausted by the end of the century. Fractional distillation is employed to remove high-boiling impurities (sulfuric acid and water) and lower-boiling impurities (silicon tetrafluoride, carbon dioxide, and sulfur dioxide) from HF.

24524

Palmer, R. K. and B. J. Steigerwald

WASTE WATER SEPARATORS AND PROCESS DRAINS. In: Emissions to the Atmosphere from Eight Miscellaneous Sources in Oil Refineries. Los Angeles County Air Pollution Control District, Calif., California Dept. of Public Health, Berkeley, Bureau of Air Sanitation, Public Health Service, Washington, D. C., Community Air Pollution Program, and Western Oil and Gas Assoc., Los Angeles, Calif., Air Pollution Control Committee, Rept. 8, Section 5, p. 32-38, 50-51, June 1958. 9 refs.

As a result of various refinery operations, hydrocarbons and hydrocarbon-contaminated water may reach the drains and waste water separators; as the mixture flows through the system, hydrocarbons are evaporated from the surface and may escape to the atmosphere through vents. A complete field testing program was not conducted because of the small magnitude of the emissions from this source. However, the total emissions of hydrocarbons from the separators an drains is estimated at about three tons per day, compiled from Los Angeles Air Pollution Control District survey figures; this figure is in agreement with information gained during inspection trips made of the systems in county refineries for the present project. Of the component sub-systems, the collection systems frequently appear to afford a greater opportunity for the escape of hydrocarbons than either the interceptor systems or the oil-water separators. In other areas, where oil-water separators are not covered, the greatest hydrocarbon emissions might occur from the separators.

24525

Bonamassa, F.

EXHAUSTS OF GAS COMPRESSOR INTERNAL COMBUSTION ENGINES. In: Emissions to the Atmosphere from Eight Miscellaneous Sources in Oil Refineries. Los Angeles County Air Pollution Control District, Calif., California Dept. of Public Health, Berkeley, Bureau of Air Sanitation, Public Health Service, Washington, D. C., Community Air Pollution Program, and Western Oil and Gas Assoc., Los Angeles, Calif., Air Pollution Control Committee, Rept. 8, Section 6, p. 39-42, 50-51, June 1958. 9 refs.

Atmospheric emissions were determined from the internal combustion engines used to drive gas compressors in refinery operations; the engine is usually a four-cycle gas engine fueled by natural gas. Operating data were obtained from the six major companies operating 95% of the gas compressor engines in Los Angeles County refineries. Hydrocarbons were measured in exhaust gases by mass spectrometry, infrared spectrophotometry, or gas chromatography. Oxides of nitrogen were determined by the phenoldisulfonic acid method, ammonia by the Kjeldahl method, and aldehydes by a modified sodium bisulfite method. The hydrocarbons, generally over 95% methane and ethane, amount to 6.5 tons per day. Total oxides of nitrogen, as NO2, account for 4.5 tons per day. Small amounts of ammonia, and aldehydes are also emitted.

24526

Sussman, V. H.

WASTE GAS FLARES. In: Emissions to the Atmosphere from Eight Miscellaneous Sources in Oil Refineries. Los Angeles County Air Pollution Control District, Calif., California Dept. of Public Health, Berkeley, Bureau of Air Sanitation, Public Health Service, Washington, D. C., Community Air Pollution Program, and Western Oil and Gas Assoc., Los Angeles, Calif., Air Pollution Control Committee, Rept. 8, Section 7, p. 43-46, 50-51, June 1958. 9 refs.

Two types of waste gas flares, both of the smokeless type, are used in refineries located in Los Angeles County for the disposal of excess gas production and hydrocarbon vapors from certain refinery operations: the air-inspirating venturi flare is used by most of the smaller independent plants, while the steam-injected flare is used by all major refineries. Although actual field testing of flares was not feasible, it is concluded on the basis of the smokeless operation and certain data available from a flare test in another county that essentially complete combustion occurs in the flares, and that emissions of organic vapors and particulate matter from this source are negligible. Depending on the composition of the waste gas and the temperatures in the combustion zone, oxides of sulfur and oxides of nitrogen may be released as a result of the operation of these flares.

24527

Lunche, R. G.

VACUUM JETS. In: Emissions to the Atmosphere from Eight Miscellaneous Sources in Oil Refineries. Los Angeles County Air Pollution Control District, Calif., California Dept. of Public Health, Berkeley, Bureau of Air Sanitation, Public Health Service, Washington, D. C., Community Air Pollution Program, and Western Oil and Gas Assoc., Los Angeles, Calif., Air Pollution Control Committee, Rept. 8, Section 8, p. 47-51, June 1958. 9 refs.

A steam-driven vacuum ejector or jet, consisting of several ejector stages in series with interstage condensers, is the common method for producing and maintaining a vacuum in refinery process equipment. Malodorous hydrocarbon emissions were vented to the atmosphere as non-condensable gases from the last stage of the vacuum jet system. These emissions decreased progressively from 17 tons in 1951 in Los Angeles County to zero in 1957 as a result of control installations, which condense as much of the vacuum jet effluent as is practical and recover the remaining gases and vapors, which are then vented to a fume incinerator or firebox. The liquid condensate can be separated into water and hydrocarbon. No testing program was conducted, since all known refinery jets are under control.

24601

Bonamassa, F.

LOADING FACILITIES. In: Emissions to the Atmosphere from Eight Miscellaneous Sources in Oil Refineries. Los Angeles County Air Pollution Control District, Calif., California Dept. of Public Health, Berkeley, Bureau of Air Sanitation, Public Health Service, Washington, D. C., Community Air Pollution Program, and Western Oil and Gas Assoc., Los Angeles, Calif., Air Pollution Control Committee, Rept. 8, Section 3, p. 19-24, 50-51, June 1958. 9 refs.

Calculations were made to determine hydrocarbon vapor emissions to the atmosphere from final product filling of vessels (railroad tank cars, tank trucks and trailers, or drums) at refineries in Los Angeles County; emissions from loading at bulk stations or marine terminals located outside the refineries are not included. Questionnaires were completed by the refineries on the average daily amounts of products shipped, divided into four categories by Reid vapor pressure. Vapor recovery systems on loading facilities are in widespread use; all of the liquefied petroleum gas, almost all the motor and aviation gasolines, and about 30% of the other distillates (vapor pressure 1-4 lbs) are loaded under vapor recovery. The total emissions of hydrocarbons from loading operations in county refineries amounted to 1800 lbs/day. If vapor recovery were not used, an additional 22,700 lbs/day would be emitted.

24602

Palmer, R. K. and B. J. Steigerwald

TURNAROUNDS, EQUIPMENT MAINTENANCE, AND BLOWDOWN SYSTEMS. In: Emissions to the Atmosphere from Eight Miscellaneous Sources in Oil Refineries. Los Angeles County Air Pollution Control District, Calif., California Dept. of Public Health, Berkeley, Bureau of Air Sanitation, Public Health Service, Washington, D. C., Community Air Pollution Program, and Western Oil and Gas Assoc., Los Angeles, Calif., Air Pollution Control Committee, Rept. 8, Section 4, p. 25- 31, 50-51, June 1958. 9 refs.

Estimates were made of hydrocarbon emissions from start-up and shut-down refinery unit procedures ('turnaround') and equipment and storage tank maintenance at oil refineries in Los Angeles County. Calculations were made on the basis of field surveys and a questionnaire to the refineries. The maximum atmospheric emissions from turnarounds are calculated as 254 tons per year, an average of 0.7 ton per day; however, since 60% of all shutdowns occur on Sunday and Monday, the weekend (Sun. and Mon.) emissions are 152 tons per year, or an average of 3 tons per weekend. Maximum emissions from tank cleaning average 1.3 tons per day of hydrocarbo vapors, with tank cleaning operations spread more or less uniformly throughout the week.

24721

Palmer, R. K.

BLIND CHANGING. In: Emissions to the Atmosphere from Eight Miscellaneous Sources in Oil Refineries. Los Angeles County Air Pollution Control District, Calif., Calif. Dept. of Public Health, Berkeley, Bureau of Air Sanitation, Public Health Service, Washington, D. C., Community Air Pollution Program, and Western Oil and Gas Association, Los Angeles, Calif., Air Pollution Control Committee, Rept. 8, Section 2, p. 14-18, 50-51, June 1958. 9 refs. (Joint District, Federal and State Project for the Evaluation of Refinery Emissions.)

Blind changing, or the closing off of unused feeder lines in single refinery pipes that carry several different products, results in spillage of hydrocarbons. A questionnaire was prepared sent to the 13 Los Angeles refineries that change blinds requesting that they keep an accurate 2-month record on all changes on lines carrying products with volatilities as high or higher than kerosine along with sufficient data to permit a reasonably accurate evaluation of hydrocarbon emissions to the atmosphere. The resulting data are presented. Assuming an average specific gravity of 0.75, the emission to the atmosphere of 2000 gallons of hydrocarbons for a 61-day period indicates emissions of 200 lbs/day

24723

Sussman, V. H.

AIR BLOWING. In: Emissions to the Atmosphere from Eight Miscellaneous Sources in Oil Refineries. Los Angeles County Air Pollution Control District, Calif., California State Dept. of Public Health, Berkeley, Bureau of Air Sanitation, Public Health Service, Washington, D. C., Community Air Pollution Program, and Western Oil and Gas Association, Los Angeles, Calif., Air Pollution Control Committee, Rept. 8, Section 1, p. 6-13, 50-51, June 1958. 9 refs. (Joint District, Federal and State Project for the Evaluation of Refinery Emissions.)

Atmospheric emissions from air blowing, a minor operation in which air is blown through petroleum fractions for removal of turbidity due to moisture and for agitation during treating, were measured in the three Los Angeles County refineries which employ the process The effluent from the operation contains hydrocarbon vapors and aerosols. The total emissions from air blowing in the County are relatively small compared to the total of all hydrocarbon emissions from refinery operations. The units tested, location of sampling points, sampling and analytical methods, and calculations are described. The concentration of hydrocarbons in the mine sampling tube as determined by an infrared spectrophotometer 10-30 ppm (as hexane) for all units tested. Total emission rate was 35 lbs/day for five of the seven units tested; the rate for the sixth was 2 lb/day, and for the seventh, scheduled for discontinuation, was 905 lb/day.

25197

Hidy, G. M. and S. K. Friedlander

THE NATURE OF THE LOS ANGELES AEROSOL. Preprint, International Union of Air Pollution Prevention Associations, 42p., 1970. 43 refs. (Presented at the International Clean Air Congress, 2nd, Washington, D. C., Dec. 6-11, 1970, Paper CP-13C.)

Two classes of mechanisms for the introduction of aerosols into an urban atmosphere are identified, one primary and the other secondary in nature. Primary production implies generation at the source, while the secondary mechanism involves chemical reactions of pollutant gases within the atmosphere. Taking Los Angeles as an example, the significance of aerosol production by chemical means in highly reactive urban atmospheres is documented based on limited available evidence. Several characteristic features of the Los Angeles aerosol are considered in the light of the changing nature of sources in the past few years, as well as the local background material, and meteorology. Evidence suggests that the bulk of the anthropogenic aerosol produced in Los Angeles is below a few micron in diameter. This material represents at least twice the mass of the natural background from the Pacific maritme atmosphere. Based on a preliminary inventory, it appears that atmospheric chemical reactions may account for one-third of the anthropogenic aerosol observed in the Los Angeles area. The effect of these aerosols on visibility is discussed. For development of predictive models of aerosol dynamics in polluted atmospheres, both the local meteorology and the chemical kinetics have to be known with better certainty than is presently available. (Author abstract modified)

25213

Hidy, G. M. and J. R. Brock

AN ASSESSMENT OF THE GLOBAL SOURCES OF TROPOSPHERIC AEROSOLS. Preprint, International Union of Air POllution Prevention Associations, 41p., 1970. 30 refs. (Presented at the International Clean Air Congress, 2nd, Washington, D. C., Dec. 6-11, 1970, Paper ME-26A.)

Based on current knowledge of the sources and production mechanisms of tropospheric aerosols, an assessment is made of the relative contribution of material from natural and anthropogenic origins. The survey indicates that more than half of the aerosol presently in the lower atmosphere comes from 'secondary' processes such as chemical reactions in the gas phase. The principal known or suspected participants in such reactions are volatile hydrocarbons, nitrogen oxides, ammonia, and sulfur compounds such as hydrogen sulfide and sulfur dioxide. The man-made contribution at this time amounts to about 6% of the total production rate, which is set at approximately 10 to the seventh power tons/day. A projection of the expected production rate assuming middle 1960 control methods suggests that the anthropogenic portion will increase the total aerosol concentration in the troposphere by about 11% through the year 2000. This increase will reduce the visibility by a corresponding amount, and it may reduce the amount of solar radiation reaching the earth's surface about 2% in the middle latitudes. (Author abstract modified)

27070

Dickey, S. W. and C. W. Phillips

AIR POLLUTION CONTROL FEATURES OF A MODERN REFINERY. American Chemical Society, Div. of Petroleum Chemistry Inc. and American Chemical Society, Pittsburgh, Pa., Div. of Water, Air, and Waste Chemistry, American Chemical and Society Joint Symposium on Experience with Pollution Control Equipment, Chicago, Ill., 1967, p. A41-A42. (Sept. 11-15.)

Of the rules and regulations established by the Los Angeles Air Pollution Control District, more than a dozen now directly affect oil refining in the area. The 12 most important rules are listed and briefly described. Included are rules limiting the discharge of smoke of No. 2 Ringelmann or above to three minutes in any one hr; the sulfur content of gaseous fuel to 50 grains per 100 cu ft, calculated as hydrogen sulfide; and the discharge of sulfur compounds to 0.2% volume, calculated as SO2. Other rules pertain to permits for equipment, storage of petroleum products, mandatory vapor control systems on oil-effluent water separators, emission of dust and fumes, gasoline loading into trucks and trailers, and the control of solvents.

27082

Marier, Jean and N. Letourneau

TWENTY ONE % O2 PLUS 79% N2 EQUALS BREATHABLE AIR... MAY IT STILL REMAIN IN MONTREAL. (21% O2 plus 79% N2 equal air respirable... s'il en reste encore a Montreal). Text in French. Ingenieur (Montreal), 54(227):14-20, Feb. 1968.

Like all large cities favored by the abundance and proximity of industry, Montreal is plagued by air pollution. Most large American cities spend an average of .10 per capita in their battle against pollution. If Montreal set a mean of .20 per capita, it would have to devote approximately $400,000 per year. It is absolutely impossible for Montreal to limit its atmospheric pollution control to a local plan. It is necessary for the Montreal region to obtain with the help of the Ministry of Health of Quebec the jurisdical and administrative tools for control on a metropolitan area scale. The amount of hydrocarbons, sulfur oxides, nitrogen vapors, aldehydes, acids, and solids are tabulated for automobiles, electric power production, incineration, and refineries are tabulated.

27293

Winthrop, S. O.

AN OVERVIEW ON AIR POLLUTION. Chem. in Can., 23(2):21-25, Feb. 1971.

In 1966, the five air pollutants accounting for 98% of all emissions in the U. S. were carbon monoxide (52%), sulfur oxides (18%), hydrocarbons (12%), particulates (10%), and nitrogen oxides (6%). By far the greatest source of the pollutants is the combustion of fossil fuels. Other important sources are industrial activities such as iron and steel manufacturing, metal smelting, oil refining, pulp and paper, chemical, and petrochemical operations. The adverse health effects associated with air pollutants are noted, as are their effects on vegetation and their possible effects on climate and global ecology. The ultimate control of air pollution will require the application of science and a greatly increased research and development effort by governments, universities, and industries.

28976

Bajusz, Alex J.

HYDROGEN SULFIDE. Pollut. Eng., 3(1):17, Jan.-Feb. 1971.

Hydrogen sulfide is present in most petroleum and natural gas deposits; it is a by-product of petroleum refinery operations; coal-coking operations; and the manufacture of carbon disulfide, viscose rayon, and kraft pulp. The gas is extremely hazardous because of its toxicity and explosive nature; the maximum safe toxic concentration is about 10 ppm while the explosive range of hydrogen sulfide in air is 4.3-45% at an ignition temperature of 250 C. Hydrogen sulfide can be measured continuously with an electrolytic titrator and removed by absorption into an alkaline solution or by wet and dry oxidation methods. The first type of process is used for gas streams containing large amounts of H2S with little or no carbon dioxide. The second group of processes treat gas streams with small amounts of H2S and a high proportion of CO2.

29599

Okuno, Toshihide, Masahiko Tsuji, and Kokei Takada

PROBLEMS OF PUBLIC NUISANCE CAUSED BY BAD ODORS IN HYOGO PREFECTURE. (Hyogo kenka ni okeru akushu kogai no mondaiten). T in Japanese. Hyogo Prefecture, Kobe (Japan), Environmental Science Inst., Rept. 2, p. 18-24, Feb. 1971.

Hyogo factories which generated bad odors included fish bone and waste treatment plants, oil and fat manufacturing, petroleum refineries, nitrogenous superphosphate of lime manufacturing plants synthetic resin processing plants, and sewage treatment plants. The odorants were amine ammonia, low fatty acids, sulfur compounds, including mercaptan and hydrogen sulfide, olefin, paraffin hydrocarbons, and polycyclic aromatics. In a nitrogenous superphosphate of lime fertilizer manufacturing plant, most odors were produced during the processing stages where the nitrogenous superphosphate of lime completely matured in the reactor, was taken out, was carried over to the dryer by a belt conveyor, and was dried. The odorants of the matured superphosphate of lime in the stock room were aldehyde (0.04-0.63 ppm) and amine (0.004-0.252 ppm). The quantity of the aldehyde and amine varies with the amount of ammonium sulfate added and with the

heating temperature. When measured under weather conditions of 15 C and wind velocity of 1-2 m/sec, the density of the aldehyde was 50-200 ppb at a spot 500 m away and 240-460 ppb 100 m away, while the amin was 100-150 ppb and 150-210 ppb respectively. The lowest odor producing density was 0.066 ppm for acetaldehyde and 0.7-0.4 ppm and 1.0-0.8 ppm for n-butylamine. Thus, the odor can be smelled as far away as 1400 m, depending on weather conditions. A fish bone and waste processing plant and a synthetic resin processing plant were similarly studied. Since the odor-producing substances are discharged at various stages of the production process, it is difficult to lead all the odorants into an odor treatment device. It is also economically impractical to seal or encase the entire building and then treat all the air in the building. The lowest odor producing density of the odorants is very low, indicating the technical difficulty of the deodorization. Also, it is doubtful that the problem can be solved by increasing chimney height. A possible solution is a sealed plant equipped with both a continuous scrubber to wash the exhaust gas and chemical treatment or a Cottrell system.

29786

Becker, Karl H.

PHYSICAL-CHEMICAL PROBLEMS OF AIR POLLUTION. (Physikalisch- chemische probleme der Luftverunreinigung). Text in German. Chem. Unserer Zeit., 5(1):9-18, Feb. 1971. 46 refs.

Principal air pollutants are reviewed. Carbon monoxide is generated by the incomplete combustion of fossil fuels, for instance in an automobile engine which emits 0.5 to one ton of carbon monoxide per automobile per year. Since CO is converted to the harmless carbon dioxide at elevated temperatures only, it can stay in the atmosphere for two to three years. Sulfur dioxide is produced when heavy fuel oils and coal, containing sulfur in various concentrations are burned. When in the air, sulfur dioxide is oxidized to sulfur trioxide, which can combine with water vapor to form sulfuric acid and can cause the formation of smog which disappears from the atmosphere with rain. Hydrocarbons are emitted by petrochemical industrial plants and are also components of automobile exhausts. Automobile exhausts also emit nitric oxide and nitrogen dioxide. Halides as pollutants usually occur in small concentrations, except in some areas of steel and aluminum producing plants where greater concentrations of hydrochloric and hydrofluoric acids may occur. The incineration of scrap synthetic materials, such as polyvinyl chloride and teflon also cause pollution from the chlorine and fluorine compounds. Other pollutants mentioned are carcinogens such as benzpyrene and other polycyclic hydrocarbons contained in the soot emitted by diesel engines and lead compounds present in automobile exhaust gases, if gasoline containing tetraethyl lead as antiknock agent is used.

30513

Kobaysshi, Yoshitaka

ENVIRONMENTAL POLLUTION PREVENTION MEASURES IN FACTORY. (Kojo ni okeru kogai boshi taisaku). Text in Japanese. Preprint, Safety Engineering Assoc., Tokyo (Japan), 22p., 1970. (Presented at the Association of Safety Engineering Seminar, 19th, Yokohama, Japan, Nov. 26-27, 1970.)

Various forms of environmental pollution for which industrial activities are primarily responsible are discussed, including the results of a survey of measures taken by 2512 plants to combat industrial pollution. With regard to air pollution, several major cities in the U. S. are compared with Tokyo in terms of sulfur dioxide, hydrocarbon, oxidant, carbon monoxide, and nitric oxide. Sources of industrial pollution are tabulated to indicate types of air pollutants discharged from particular branches of industry; for instance, SO2 from power generation, iron and steel manufacturing, oil refining and petrochemical operations. Of the 2512 plants surveyed in February 1970, only 1089 attempted to check industrial pollution. Antipollution measures being taken by representative firms are also listed by individual firms. The effects of sulfur oxides on human health is shown by a graphic representation of the case of Yokkaichi asthma; according to the graph, significant health effects are seen when man is exposed to air with an SO2 density of even less than 0.02 ppm for about a year, or to air with 1.0 and 2.0 ppm SO2 for a few minutes. The atmospheric density of CO (ppm) and rate of carboxyhemoglobin in blood (%) are discussed in relation to human health. A table of chemical substances with their critical density for offensive odors is given as well as a diagram indicating lead density by month in relation to rainfall and wind velocity. Another diagram indicates photochemical process in an experimental case and still another shows the relationship between lead density and cadmium density in the atmosphere.

31880

Steigerwald, Bernard J. and A. H. Rose

ATMOSPHERIC EMISSIONS FROM PETROLEUM REFINERIES. A GUIDE FOR MEASUREMENT AND CONTROL. Public Health Service, Cincinnati, Ohio Div. of Air Pollution, PHS Pub.-763, 56p., 1960. 11 refs. NTIS: PB 198096

The process of petroleum refining and atmospheric emissions from oil refineries were discussed. General information on the processes and equipment used in oil refineries to manufacture petroleum products was given. Crude oil distillation, conversion by cracking, catalytic reforming, polymerization, alkylation, isomerization, treatment with hydrogen and chemicals, and blending were also briefly described. Sources of emission from oil refineries include storage tanks, catalyst regeneration units, pipeline valves and flanges, pressure relief valves, pumps and compressors, compressor engines, cooling towers, loading facilities, waste water separators, blowdown systems, boilers, process heaters, vacuum jets, sampling, air blowing, and acid treating. The main emissions are sulfur oxides, nitrogen oxides, hydrocarbons, carbon monoxide, and malodorous materials. Lesser emissions include particulates, aldehydes, ammonia, and organic acids. The most important factors affecting refinery emissions are crude oil capacity, air pollution control measures, general level of maintenance and good housekeeping in the refinery, and the processing scheme employed. The estimation of atmospheric emissions from oil refineries was demonstrated.

31882

Blokker, P. C.

AIR POLLUTION BY THE OIL INDUSTRY. (Luchtbezoedeling door de olie-industrie). Text in Flemish. Meded. Vlaam. Chem. Ver., 32(6):203-212, Nov./Dec. 1970. 14 refs.

The main potential sources of air pollution from the petroleum industry, excluding the petrochemical industry, are given. The emissions are compared with those from power stations, domestic fuel, and motor traffic. Emissions of nitrogen oxides, hydrocarbons, carbon monoxide, and particulates from the petroleum industry are low in comparison with those arising from other sources. The industry s most important pollutants are sulfur dioxide and odorous gases. Dispersion from high stacks is often an effective means of solving local pollution by sulfur dioxide. For odor abatement, prevention is the best method; examples are given. The problem of abatement cost

and norms are briefly discussed. Where health is not impaired, the aim should be a low cost/benefit ratio. The industry is not averse to reasonable norms provided that the level and maintenace are similar in different countries. (Author abstract modified)

31883

Sherwood, R. J.

TRENDS IN THE REFINERY ENVIRONMENT. Med. Bull. Standard Oil, New Jersey, 31(2):142-156, July 1971. (Also: Petrol. Rev., Feb. 1971.)

The universal requirement for planning authorization ensures that environmental factors are considered in the location, planning, and operation of new refineries. In almost all environmental matters, the principle criterion is amenity, not health. Sometimes it may concern economy (for example, damage to growing crops or fisheries), and a simple economic criterion can then be developed. Where the basis for environmental control is clearly that of human health, this will transcend economic considerations and considerable attention must be given to effective evaluation and control. Amenity aspects are more difficult to assess and are likely to become more stringent with rising living standards; they are particularly influenced by the situation of any particular refinery. Potential problem areas in the external and internal environment of a refinery are identified. Among the former are air pollution, neighborhood noise, flares, water and ground pollution, and accidental discharge of hazardous substances. Internal problems include exposure of the isolated worker to toxic substances and noise, lighting, and thermal conditions.

32351

Lemke, Eric E., George Thomas, and Wayne E. Zwiacher

PROFILE OF AIR POLLUTION CONTROL IN LOS ANGELES COUNTY. Los Angeles County Air Pollution Control District, Calif., 66p., Jan. 1969.

A profile of air pollution sources, the effectiveness of the control program, and a projection for the future in Los Angeles are presented. The Federal Clean Air Act of 1967 figures prominently in the future projections, because it is assumed that California will set motor vehicle emission standards more stringently than the Federal standards. About 13,500 tons of air contaminants are still being emitted daily, primarily because of automobile emissions which comprise approximately 90% of the uncontrolled emissions. Major sources are listed with data on type and amounts of particulates emitted, and the amounts prevented. Motor vehicle sources include exhaust, blowby, and evaporation in gasoline-powered engines and diesel-powered engines; the prevention methods for motor vehicle emissions include crankcase and exhaust control. Other sources include organic solvents (surface coating, dry cleaning, and degreasing), chemica's (sulfur and sulfuric acid plants), incineration, non-ferrous metal production, cupolas, electric steel furnaces, open hearths, mineral production (including asphalt), and petroleum (refining, marketing, and production). Rule 62 prevents contamination from power plants and other fuel combustion processes. Jet and piston driven aircraft, ships, and railroads are also sources. Contaminants include nitrogen oxides, sulfur dioxide, carbon monoxide, hydrocarbons, and particulates. The distribution of chemical processing equipment, boilers, heaters, paint bake ovens, incinerators, metal melting equipment, concrete batch plants, petroleum processing equipment, rendering equipment, and power plant boilers are shown. Daily emissions from fuel oil, natural gas, and refinery make gas are shown. Also, steam and electric power plants are discussed. When motor vehicle exhaust reacts with the air, photochemical smog can be formed which causes eye irritation; the California Pure Air Act has set standards which should eliminate this. Stationary and mobile sources, air monitoring stations, seasonal changes, ozone concentrations, wind effects, daily concentration levels, oxidant levels, and alerts are also discussed.

32465

Gondim, Pedro M.

CONTRIBUTION OF INDUSTRY TO AIR POLLUTION. (Contribuicao da industria para a poluicao do ar). Text in Spanish. Rev. Servico Especial Saude Pub., 16(1):69-91, 1971. 13 refs.

Petroleum refineries, metallurgical processing, and the production of cement are examples of industrial sources of air pollution. These are stationary sources. Mobile sources of air pollution, in particular, the automobile, are becoming an increasing source of problems in urban areas. Automobiles are a product of industry, and industry should be responsible for the control of their emissions. Crankcase and fuel evaporation emissions are under control in the United States, but thermal and catalytic afterburners do not yet satisfactorily control exhaust emissions. In developing countries, such as Brazil, industry is needed, but there are good reasons for also starting an air pollution control program. Pollutants such as sulfur oxides, hydrocarbons, nitrogen oxides, particulates, aldehydes, ammonia, odors, and carbon monoxides are emitted by industry. (Author summary modified)

32475

Japan Environmental Sanitation Center, Tokyo

REPORT OF SURVEY OF THE SPECIFIED POISONOUS SUBSTANCES AND THE PREVENTION OF OFFENSIVE ODOR. REPORT 4. (Tokutei yugaibusshitsu narabini akushu boshi ni kansuru chosa kenkyu hokokusho (Dai 4 po)). Text in Japanese. 67p., Aug. 1969. 14 refs.

The kraft pulp and petro-chemical industries were examined as sources of offensive odors and the actual cotdition of the offensive odor was analyzed. The present state of odorous emissions from these industries, problems, and countermeasures are discussed. The offensive odors produced in the digester process of a kraft pulp industry in Fuji City, Shizuoka Prefecture were measured by a sense organ method, obtained by modifying the odorless chamber. The odors were analyzed by the salt-balanced method, the glass beads tube (selective adsorption of offensive odors), and the low temperature adsorption method (concentration of the odor by liquid oxygen). The volumes of dimethyl-disulfide, hydrogen sulfide, mercaptan, and dimethyl sulfide in the odor were great. Odors analyzed from the recovery boiler in the kraft pulp factories in Miyagi Prefecture contained 1-4 ppm methyl mercaptan, 20-300 ppm hydrogen sulfide, and approximately 1 ppm dimethyl sulfide. The volume of gas emitted at that time was 290,000 cu m. About 1% of methyl mercaptan and dimethyl sulfide was detected from the turpentine tank. Odors from petro-chemical factories in Yamaguchi Prefecture were measured by gas chromatography. The odors were composed of vinyl chloride, 1,3-butadiene, propylene oxide, acetaldehyde, methyl acetate, and ethylene dichloride.

33207

Elkin, Harold F.

PETROLEUM REFINERY EMISSIONS. In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 34, p. 97-121. 23 refs.

The common air pollutants emitted during the petroleum refining process are discussed. Oil refining technology is explained and flow diagrams of typical refineries are included. Individual refineries vary greatly in the character and quantity of emissions. Controlling factors include crude oil capacity, type of crude processes, type and complexity of the processing, air pollution control measures in use, and the degree of maintenance and good housekeeping procedures in force. Refining emissions may be classified as smoke and particulate matter, hydrocarbons, and other gaseous compounds, principally sulfur and nitrogen oxides. In crude separation, the use of barometric condensers can release noncondensable hydrocarbons to the atmosphere. Regeneration of catalyst in cracking by controlled combustion can release unburned hydrocarbons, carbon monoxide, ammonia, and sulfur oxides. Smokes and particulate matter are controlled by cyclones and electrostatic precipitators. Most of the gaseous emissions can be controlled by scrubbing and efficient combustion operations. The blending and hydrodesulfurization of petroleum products are also described.

33883

Rayzacher, B.

THE OIL INDUSTRY AND THE ENVIRONMENT. Stichting Concawe, The Hague (Netherlands), Rept. 8/70, 17p., April 1970. 15 refs.

The initial step in oil production, recovery of the crude oil from its natural deposits, does not have any appreciable adverse environmental effects. Transport by ocean tanker, pipeline, and road and river tankers does often cause pollution of the soil, land and surface, and of ground and surface waters. Malodorous emissions during the refining process are complicated by the numerous points, some a considerable distance from the ground, where leakages may occur, and by the human olfactory sense which can detect the presence of some compounds at extremely low concentrations. Good maintenance and constant equipment control are required. Sulfur emissions in the refining process stem from the frequent use of high-sulfur fuels for various plant operations and from flare burn-off. Control methods in the former case include desulfurization and dispersion by tall stacks. Water pollution and noise problems from refining are also discussed. Wrong or negligent use of petroleum products contribute to air and water pollution, but here correction rests to a large degree with the individual user. For example, by correct adjustment of the carburetor and ignition, automotive exhaust emissions can be reduced by up to 50%. The costs of producing unleaded no-knock gasolines, of desulfurizing fuel oils, and of using naturally low-sulfur fuels are discussed.

33931

Amero, R. C.

FUELS FOR TRANSPORTATION. Preprint, American Society of Mechanical Engineers, New York, Fuels Div.; Inst. of Fuel, London (England); Inst. of Combustion and Fuel Technology of Canada, Ottawa (Ontario), 8.1-8.28, 1970. 38 refs. (Presented at the North American Fuel Technology Conference, Ottawa, Ontario, May 31- June 3, 1970, Paper ASME-NAFTC-3.)

Liquid hydrocarbon fuels supply energy for almost all of the world s transportation. The principal exception is natural gas used to power compressor stations on pipelines, if gas transmission is considered a sector of transportation. For 50 years, refinery development has meant increased yield and octane rating of gasoline. Demand for distillate (jet, diesel, and marine gas turbine fuel), though smaller, is now growing faster. Refiners have great technical versatility for converting widely different crudes into specification fuels. The technology has been extended to produce the same kinds of fuels from tar sands. Technology now being developed should be available when needed to convert shale oil and coal into conventional fuels. Air pollution controls and new engines may alter the distribution of products from the petroleum barrel, but electric automobiles, nuclear ships and other non-hydrocarbon systems are not expected to supply a large share of transportation in the foreseeable future. Fuel consumption is discussed for trucks, buses, automobiles, trains, aircraft, and ships. (Author abstract).

34023

Brief, Richard S., Jack W. Blanchard, Robert A. Scala, and Jerome H. Blacker

METAL CARBONYLS IN THE PETROLEUM INDUSTRY. Arch. Environ. Health, 23(5):373-384, Nov. 1971. 29 refs.

Metal carbonyl formation through reaction of carbon monoxide with free materials under certain conditions of temperature and pressure in the petroleum industry is reviewed with respect to operating conditions, toxicity and hazard of metal carbonyls, exposure limits, personnel protection, and recommended analytical methods for the determination of metal carbonyls. Utilizing the chemical reaction thermodynamics of metal carbonyls, nomographs were constructed for the equilibrium formation of nickel, cobalt, and iron carbonyls. Acute exposures to low concentrations of metal carbonyls produced acute pulmonary distress as a characteristic response; chronic exposures to nickel carbonyl were associated with carcinogenic activity. For evaluation of potential exposure to $Ni(CO)_4$, urinary monitoring was effective. Wet chemical methods (colorimetry and spectrophotometry) were recommended for the analysis of $Ni(CO)_4$. Colorimetric methods were also used for the determination of cobalt hydrocarbonyl and iron pentacarbonyl.

34165

Reed, Robert D.

STACK PLUMING FACTORS. Preprint, National Petroleum Refiners Association, Washington, D. C., 4p., 1970. (Presented at the National Petroleum Refiners Association, Western Regional Meeting, Salt Lake City, Utah, Sept. 22-23, 1970, Paper WR-70-63.)

Many petroleum refinery stack plumes are not innocent water vapor but rather are potential air polluters. The vent-stack of cat-crackers is typical; the constituents of the plume may be hydrogen, carbon dioxide, carbon monoxide, oils, synthesized organic compounds, sulfur compounds, water vapor, and catalyst fines. The solution to controlling plume material lies in the application of a specific burner design and utilization immediately at the point where the cat-cracker gases are discharged to the atmosphere. Sulfur trioxide plumes can be controlled by direct firing of fuel into the stack for temperature elevation high enough to allow an adequate state of diffusion into the atmosphere prior to dew-point temperature.

34177

Struth, Bert W.

THE IMPACT OF NEW GASOLINE SPECIFICATIONS ON REFINERIES OF THE FUTURE. Preprint, American Inst. of Chemical Engineers, New York, 26p., 1971. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971.)

Normal growth, a changing natural resources picture, obsolescence, and pollution control will result in refinery expansion of over 10 billion dollars over the next decade. The refinery processing resulting from anticipated changes in gasoline specifications due to pollution control regulations is discussed. The major question facing the industry is how to replace the leaded octane numbers. Advantages and disadvantages connected with catalytic cracking, alkyiation, hydrocrackling, residuum upgrading processes, and catalytic reforming are corsidered, as well as the supply/demand balance. Future trends are cited. Isopentane separation from the light straight run, followed by isomerization of the normals, appears to be the first step in upgrading the low-octane naphthas. The carbon-6 to carbon-9 aromatics are by far the most economically available hydrocarbons. The feed for catalytic reformers will change drastically. Next to aromatics, alkylate made of isobutane and C2 to C5 olefins offers the refiner the next highest research octane value component. The effect of lead removal is discussed.

B. CONTROL METHODS

00107

S. S. Griswold

CONTROL OF STATIONARY SOURCES (TECHNICAL PROGRESS REPT. VOLUME 1). Los Angeles County Air Pollution Control District, Calif. Apr. 1960. 191 pp.

As a result of the intensive source control measures administered in Los Angeles County, Virtually all industrial operations have been brought within the scope of the air pollution control program. From the melting of metal to the painting of manufactured goods, specific industrial processes and equipment have been subject to air pollution control measures. This volume provides individual discussion of control techniques applied to the most significant stationary sources of air contamination. Certain source emission problems, such as those traceable to the operation of railroad locomotives and ships, are not discussed in this volume in view of the current unimportance of the source. The material reported in this volume generally contains only those developments occurring subsequent to the publication of the Second Technical and Administrative Report on Air Pollution Control in Los Angeles County, 1950-51. (Author)

00975

M. I. Weisburd, (Compiler and Ed.)

AIR POLLUTION CONTROL FIELD OPERATIONS MANUAL (A GUIDE FOR INSPECTION AND ENFORCEMENT). Public Health Service, Washing- ton, D. C., Div. of Air Pollution, 1962. 291p.

Author discusses sources, control methods, training techniques and related aspects of air pollution. Document is an excellent source for specific information on equipment being used in air pollution control. Pictures, diagrams, schematics and charts are given.

01134

H. Juntgen

PROCEDURE FOR THE DRY SEPARATION OF SULFUR DIOXIDE FROM WASTE GASES. Verfahren zur Trockenen Abscheidung von Schwefeldioxid aux Abgasen. Chem. Ing. Tech. (Weinheim) 38(7):734-736, July 1966.

In the dry processes for separating sulphur dioxide from waste gases, the SO2 is bound by adsorption onto carbon-containing substances, or chemically by reacting with metallic oxides or carbonates in the presence of oxygen to form sulphates. The regeneration of the sulphates involves a considerable outlay and usually proceeds via various intermediate stages, whereas the SO2 can be removed relatively simply from the carbon-containing absorbents either by washing out with water or by applying heat. (Author summary)

01537

ELIMINATING SMELL FROM A REFINERY. Petroleum (London) 29(4):148-150, Aug. 1966.

The methods used for eliminating smell from a refinery are described. Even after use of an elaborate water purification system, schematically presented in this article, odor remained. The odor was traced to the waste water collection pit. It was found that a triple layer of Allplas polypropylene 45 mm diameter balls spread over the surface of the water in the collecting pit eliminated the odors. A single layer of balls reduced the amount of fuel needed to maintain a given solution temperature by 70%, and reduced evaporation by 88%.

02017

M.A. Termeulen

AIR POLLUTION CONTROL BY OIL REFINERIES. Proc. (Part I) Intern. Clean Air Cong., London, 1966 (Paper IV/5). pp. 92-5.

Stichting CONCAWE has been established by the Oil Companies' International Study Group for Clean Air and Water Conservation (Western Europe). Its Working Group on Atmospheric Dispersion is active in the field of abatement and control of air pollution originating from both domestic and industrial complexes. Major air-borne contaminations, from oil refining operation but not petrochemical operations, such a hydrocarbons, mercaptans, carbon monoxide, hydrogen sulphide and sulphur oxides other than from refinery flue gas, are discussed. Most common sources of the above contaminants are discussed, together with the general refinery practices for preventing or reducing emission of these contaminants. The effectiveness of modern refinery processes in reducing air pollution is reviewed and examples of local conditions and the way they affect the setting of practical limits of emissions are discussed. In conclusion, the general oil industries views with respect to the air pollution problem are summarized. (Author abstract modified)

03128

C. Padovani

METHODS OF REDUCING POLLUTION CAUSED BY SPECIFIC INDUSTRIES (CHAPTER V. OIL INDUSTRY). European Conf. on Air Pollution, Strasbourg. 1964. pp 323-36.

One general observation that can be made concerning the national reports received is that the information they contain is not full enough or specific enough particularly as regards pollution statistics, the cost of anti-pollution equipment and the results obtained. Furthermore, as regards sources of pollution and methods of control, the reports mention nothing which cannot be found in technical literature. Recent years have seen enormous refinery development in Europe owing to a steady increase in consumption and the transfer of processing plants from the areas where the crude oil is obtained to those where petroleum products are consumed. There are also signs of a tendency to concentrate production in increasingly large refineries and of a continuous increase in secondary or vertical refining processes as compared with primary or horizontal refining processes. The pollution problem has naturally been aggravated by the tendency to bring refineries closer to consumption areas. By their very appearance, the enormous size of the storage tanks, the tall distillation towers, the flares for burning the surplus gases, petrol refineries make a strong impression on the public at large and give rise to suggestions out

of all proportion to the actual threat presented to public health. It should further be pointed out that the European oil industry was almost completely reconstructed after the second world war and that, even in the field of pollution control, it is in the van of progress. However, the oil industry still needs to improve on the measures it has adopted.

04599

R. L. Chass

THE STATUS OF ENGINEERING KNOWLEDGE FOR THE CONTROL OF AIR POLLUTION. Proc. Natl. Conf. Air Pollution, Washington, D. C., 1962. pp. 272-80. 1963.

Control programs are discussed and particular the control program of Los Angeles County, also its demography, urban growth which is paralelled by increase in automobiles. Los Angeles, in spite of stringent air pollution regulations, has continued to increase its industries and to expand existing industries. In spite of the growth pattern, the engineering and enforcement functions of the District have resulted in preventing 4,500 tons of air contaminants from stationary sources, from entering the Los Angeles atmosphere each day. As it is pointed out in this paper, the air pollution problems can be solved, using sound technical and engineering approaches coupled with enlightened administrative and legislative action.

06006

Chass, R. L., C. V. Kanter, and J. H. Elliott

CONTRIBUTION OF SOLVENTS TO AIR POLLUTION AND METHODS FOR CONTROLLING THEIR EMISSIONS. J. Air Pollution Control Assoc., 13(2):64-72, 96, Feb. 1963. (Presented at the 55th Annual Meeting, Air Pollution Control Assoc., Chicago, Ill., May 20-24, 1962.)

A breakdown of the emissions of organic solvent vapors by category of industry in Los Angeles County shows that aircraft manufacturing, dry cleaning, automobile assembling, rubber production, toto-gravure printing, and furniture manufacturing are the major categories of industry responsible for approximately 30% of the total. No one industry contributes more than 8% of the total. Solvent usage contributes about 17% of all aliphatic and aromatic hydrocarbon vapors and about 70% of other emissions of origin. Application of oil-based surface coatings in all industrial, commercial and domestic activities accounts for about 55% of the total emissions from organic solvent usage. This paper summarizes the total organic emissions from solvent uses entering the Los Angeles County atmosphere each day and presents the results of an engineering development program conducted by the Los Angeles County APCD to determine the engineering and economic feasibility of controlling solvent emissions from protective coatings operations. Uncontrolled operations involve 95% of the solvent usage in the Los Angeles County. The control of solvent emissions can theoretically be accomplished by one or more of the following processes: condensation by cooling or compression, absorption, chemical modification including incineration, and adsorption. Control or recovery of organic vapors by adsorption appeared to be the most feasible approach for the low concentrations involved and was therefore selected for the experimental work. Activated carbon proved to be effective and economically feasible for the control of solvent vapors from spray finishing operations. The operational costs, including maintenance expense, and installed costs for each of the systems were estimated.

07242

THE ANNUAL REPORT FOR 1964 OF THE SUPERVISING OFFICES FOR TRADE AND INDUSTRY. Aus dem Jahresbericht 1964 der Gewerbeaufsicht. Reinhaltung der Luft in Nordrhein-Westfalen. (2), 19-38 (1965) Ger.

In 1964, the supervising offices for trade and industry (Gewerbeaufsichtsamter) in North-Rhine-Westfalia dealt with 10,262 cases where air pollution problems were involved. Tables present some statistics as to the actions taken in each case. Although the capacity of steam boiler plants had doubled in 10 years, the dust emission dropped by 34%. Many small waste burners had to be shut down since they could not meet standard emission limits. The output of cement kilns rose 250% from 1950 to 1964. In the same time dust emission dropped to 28% of its original value. Both dry and wet electrofilters are mostly used. Photographs of chimneys in operation document the favorable results. Dust emission from brick works was greatly reduced by replacement of tunnel furnaces with ring furnaces. Similar results are true for earthenware factories. Measures for reducing the brown smoke of steel converters are reported. Dust emission control for cupola furnaces is still in its beginning stage. Costs of various methods of dust removal are estimated; some preliminary results are reported. Electroplating plants remove acid fumes by spraying with neutralizing solutions. Methods of air pollution control in the chemical industry, nonferrous metal industry, petroleum industry, paint factories, and some other selected industries are also briefly mentioned. Comments on current air pollution legislation conclude this report.

07925

Beighton, J.

THE SPECIAL INDUSTRIAL PROCESSES. Roy. Soc. Health J. (London). 87(4):215-218, July-Aug. 1967. 2 refs. (London)

The air pollution problems of a group of industries which produce: sulfuric acid, nitric acid, petroleum and petrochemicals, iron and steel, copper, aluminum, gas, ceramics and electric power are reviewed. The basic technical approach is to avoid the formation of the emission by design of the process, then to require the treatment of any unavoidable emission, and finally to require adequate dispersal of any residual amount which has to be discharged. The legislation is designed to compromise between safeguarding of public health and amenities and providing for a realistic acceptance with adequate control of special processes. Although the loss of gases in the manufacture of sulfuric acid is limited to 2% of the sulfur burned, the loss from a contact acid plant with a 500-ton-per-day capacity may be considerable so that chimney heights as high as 450 ft may be required. Acid mist from contact plants burning sulfur is a special problem as it is difficult to control and its occurrence is unpredictable. There are two nitric acid plants in Britain equipped with catalytic tail-gas reduction units which should solve the problem of brown nitrous fume emission to the air. The use of special flares is required to control H2S and mercaptans emitted by oil refineries. In the steel industry the development of the Fuel-Oxygen-Scrap process is regarded as an alternative to the electric arc furnace. It is claimed that melting and refining can be carried out without exceeding a fume level of 0.05 grains per cu ft.

08071

Gammelgard, P. N.

CURRENT STATUS AND FUTURE PROSPECTS – REFINERY AIR POLLUTION CONTROL. Preprint, 13p., ((1966)). (Presented at the National Conference on Air Pollution, Washington, D. C., Dec. 13 1966.)

The oil industry has been engaged in air conservation research and practice for almost two decades, both through the efforts of individual companies and through programs of its trade association, the American Petroleum Institute. The present status and prospective methods for controlling smoke, hydrocarbons, oxides of sulfur, particulates, and carbon monoxide in the petroleum industry are discussed briefly.

08711

Jensen, D. A., and J. R. Scanlin

METHODS OF REDUCING POLLUTION CAUSED BY INTERNAL COMBUSTION ENGINE (MOTOR VEHICLES). Bull. D'Information due C.I.D.I.T.V.A., Aspects Techniques de la Securite Routiers, ((No. 4.), 29p., (Presented at the European Conference on Air Pollution, Strasbourg, France, June 1964, by Dr. John T. Middleton, Director Air Pollution Research Center, Univ. of Calif.)

A brief status report of the methods of reducing pollution caused by internal combustion engines is given. Photochemical reaction in the atmosphere is discussed. Crankcase emission control de- vices, exhaust controls, diesel control, oxides of nitrogen con- trol and evaporative losses are considered. The solution to the automobile air pollution problem will evolve and be based on the following three points; (1) The problem will be solved through a step by step approach. (2) There is every reason for optimism, based on the well proven technological record of American indus- try in resolving motor vehicle engineering problems over the last 60 years, and (3) The reason for optimism rests most importantly with the people of the State of California themselves. The

09784

Danielson, John A. (comp. and ed.)

AIR POLLUTION ENGINEERING MANUAL. (AIR POLLUTION CONTROL DISTRICT, COUNTY OF LOS ANGELES.) Public Health Service, Cincinnati, National Center for Air Pollution Control, PHS-Pub-999-AP-40, 999-AP-40, 892p., 1967. ((314)) refs. GPO: 806-614-30

The control of air pollution at individual sources peculiar to the Los Angeles area is considered. The practical engineering problems of design and operation for many sources of air pollution are emphasized. There are 11 chapters, each by different authors, and 4 appendixes. The chapter titles are: (1) Introduction; (2) Contaminants; (3) Design of Local Exhaust Systems; (4) Air Pollution Control Equipment for Particulate Matter; (5) Control Equipment for Gases and Vapors; (6) Metallurgical Equipment; (7) Control Equipment; (8) Incineration; (9) Combustion Equipment; (10) Petroleum Equipment; and (11) Chemical Processing Equipment. The introduction discusses the Los Angeles Basin, rules and regulations in Los Angeles County, and the use of the manual. The appendixes' titles are: (A) Rules and Regulations; (B) Odor-Testing Techniques; (C) Hypothetical Available Heats from Natural Gas; and (D) Miscellaneous Data.

09833

Walsh, Robert T.

BOILERS, HEATERS, AND STEAM GENERATORS. In: Air Pollution Engineering Manual. (Air Pollution Control Dis- trict, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Cen- ter for Air Pollution Control, PHS-Pub-999-AP-40, p. 525- 558, 1967. GPO: 806-614-40

Boilers, heaters, and steam plants which burn fossil fuels (oil or gas) produce large quantities of particulates oxides of sulfur and nitrogen, and acid mist due to hydrolysis of SO3. Particulate emission during normal operation and tube cleaning is discussed. The formation, reactions, kinetics, and equilibria for NOx and SOx are presented which form the basis for recommendation on firebox temperatures, combustion oxygen concentrations, and burner design for optimum performance. Pollution control equipment, such as cyclones, filters, electrical precipitators, alkaline additives, metal oxide and carbon filled adsorbers, afterburners, and various scrubbers are described and evaluated. Experimental data is given for several methods of control. Lowering excess air, catalytic decomposition of NOx, reducing flame temperatures, and eliminating air preheat are also discussed. Consideration is given to the economics of emission control, especially SOx, and to thermal efficiency.

09835

Walters, Donald F.

WASTE-GAS DISPOSAL SYSTEMS. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS- Pub-999-AP-40, p. 565-606, 1967. GPO: 806-614-30

Petroleum refineries must dispose of large quantities of hydrocarbon vent, waste, blowdown, and emergency pressure release gases. Types, design, instrumentation, and operating practices for gas disposal flares are presented. These include elevated and ground level flares, burner design, steam injection, ignition and pilot light systems, flare sizes and capacities, removal of entrained mists, and provision for emergency overloads. Pressure relief systems are also thoroughly discussed. Commonly used terms dealing with relief systems are defined. Design methods and operating procedures for safety valves (standard and balanced), rupture discs, vent lines, vent headers, and vent gas scrubbers are discussed and illustrated.

09836

Murray, Robert C.

STORAGE VESSELS. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Ageles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 606-629, 1967. GPO: 806-614-30

Various types of storage vessels for liquid and gaseous petroleum products are described and discussed in light of vapor emission problems (evaporation and breathing), pressure (advantages and tank design limitations), solar heating, and design of vessels and vapor seals. The types of vessels considered are: pressure; fixed, floating, and vapor seal roof; open top; reservoirs, pits, and ponds; and floating microsphere foam roof tanks. Specific emissions are vapors, mists, and odors. These are due to evaporation from wet vessel walls during draining operations, entrainment of material by winds, evaporation from the bulk caused by solar heating, and tank breathing due to diurnal temperature changes. Quantitative methods for determining the extent of these emissions are presented and illustrated. Emission control devices and methods included are vapor seals for floating-roof vessels, vent scrubbers, floating plastic blankets, vapor recovery systems, vapor conservation vessels, and vapor balance systems where various tank vents are connected. Graphs of installed cost for various types and sizes of vessels are presented.

09838

Cuffe, Stanley T.

CATALYST REGENERATION. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 642-652, 1967. GPO: 806-614-30

The regeneration of catalysts employed in petroleum refining processes, such as fluid and Thermofor catalytic cracking, is accomplished by burning coke and sulfur deposits from the catalyst surface. Combustion gases from regeneration include the pollutants CO, SOx, NOx, NH3, hydrocarbons, and particulate matter. Tables of data collected in 1956 are presented which specify pro- cess flow rates, catalyst circulation rates, regenerator air rates, coke burn-off rates, flue gas temperatures, particulate losses, hydrocarbon emission and analysis, and stack gas composition and volumes. Pollution control methods presented and discussed are: wet and dry cyclones, carbon monoxide waste heat boilers, and elec- trical precipitators. The economy of a CO boiler depends on the catalyst regenerator flue gas volume, temperature, fuel value, and CO2/CO ratio. An analysis of flue gases from CO waste heat boilers is presented for cases where ammonia has and has not been injected into the gas stream before the electrostatic precipitator.

09839

Kinsey, Robert H.

OIL-WATER EFFLUENT SYSTEMS. In: Air Pollution Control Dis- trict, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Cen- ter for Air Pollution Control, PHS-Pub-999-AP-40, p. 652-659 1967. GPO: 806-614-30

Oil-water effluent systems found in the petroleum industry collect and separate wastes recover valuable oils, and remove undesirable contaminants before discharge of the water to ocean, rivers, or channels. The type of liquid wastes may be classified as waste water with: Oil present as free oil, emulsified oil, or as oil coating on suspended matter; and chemicals include acids, alkalies, phenols, sulfur compounds, clay, and others. The oil-water separator design must provide for efficient inlet construction, sediment collection mechanisms, and oil skimmers. Clarification of final-effluent water streams is accomplished by filtration, chemical flocculation, and biological treatment. The most objectionable contaminants emitted from liquid waste streams are hydrocarbons, sulfur compounds, and other malodorous materials. The method presented may be used to estimate the hydrocarbon loss from oil-water separators. The most effective means of control of hydrocarbon emissions from oil-water separators has been the covering of forebays or primary separator sections with fixed roofs or floating roofs. Isolation of certain odor-and chemical-bearing liquid wastes at their source for treatment before discharge of the water to the refinery waste-water gathering system is an effective and economical means of minimizing odor and chemicals problems. Principal streams that are treated separately are oil-in-water emulsions, sulfur-bearing waters, acid sludge, and spent caustic wastes. Gravity-type oil-water separators are ineffective in breaking the oil-in-water emulsions. Meth ods of separation include direct application of heat, distillation, centrifuging, filtration, use of an electric field coagulating chemicals, air flotation systems, and biological treatment. Sulfide -and mercaptan bearing water may be steam stripped, or the sulfides may be oxidized to form acceptable thiosulfates, will produce H. S. Acid sludge is dumped, burned, or processed to recover acid or to produce byproduct. Spent caustic wastes are generally dumped, or can be used in the neutralization of acid wastes.

09840

Kinsey, R. H.

PUMPS. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 659-665, 1967. GPO: 836-614-30

Pumps are used in every phase of the petroleum industry and are available in wide variety of models, sizes, capacities and materials used for construction. All the common machinable metals and alloys, as well as plastics, rubber, and ceramics, are used. Pumps may be classified under two general headings, positive displacement and centrifugal. Positive-displacement pumps have as their principle of operation the displacement of the liquid from the pump case by reciprocating action of a piston or diaphragm, or rotating action of a gear, cam, vane, or screw. Centrifugal pumps operated by the principle of converting velocity pressure generated by centrifugal force to static pressure. Velocity is imparted to the fluid by an impeller that is rotated at high speeds. The fluid enters at the center of the impeller that is rotated at high speeds. The fluid enters of the impeller and is discharged from its periphery. Power for driving the various types of pumps is usually derived from electric motors, internal combustion engines, or steam drives. Any leak in the pumping equipment causes emission of hydrocarbon vapors and malodorous sulfur compounds. Several means have been devised for sealing the annular clearance between pump shafts and fluid casings to retard leakage. For most refinery applications, packed seals and mechanical seals are widely used. Typical packed seal generally consist of a stuffing box filled with sealing material that encases the moving shaft. Lubrication of the contact surfaces of the packing and shaft is effected by a controlled amount of product leakage to the atmosphere. The second commonly used means of sealing is the mechanical seal. This type of seal can be used only in pump that have a rotary shaft motion. A simple mechanical seal consists of two rings with wearing surfaces at right angles to the shaft. One ring is stationary while the other is attached to the shaft and rotates with it. A spring and the action of fluid pressure keep the two faces in contact. Lubrication of the wearing faces is effected by a thin film of the material being pumped. The wearing faces are precisely finished to ensure perfectly flat surfaces. For cases not feasible to control with mechanical seals, specialized types of pumps, such as canned, diaphragm, or electromagnetic, are required. A pressure-seal-type application can reduce packing gland leakage. A liquid, less volatile or gangerous than the product being pumped, is introduced between two sets of packing at a higher pressure than the product. Volatile vapors that leak past a main seal may be vented to vapor recovery by using dual

09841

Kinsey, Robert T.

VALVES. In: Air Pollution Engineering Manual. (Air Pol- lution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub- 999-AP-40, p. 669-672, 1967. GPO: 806-614-30

The petroleum industry employs numerous valves in its operations. Many of these valves leak causing emission of hydrocarbon vapors averaging 12 per cent of the total process emission. Data on valve leakages in Los Angeles County refineries is

presented (1958). The proposed emission control method for flow control valves is frequent inspection and maintenance. Rupture discs can be used to eliminate pressure relief and safety valve leaks.

09842

Murray, Robert C.

COOLING TOWERS. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 672-675, 1967. GPO: 806-614030

Cooling towers are major items of heat-transfer equipment in the petroleum and petrochemical industries. They are designed to cool, by air, the water used to cool industrial processes. Cooling of the water by air involves evaporation of a portion of the water into the air so that the remaining water is cooled by furnishing heat for this evaporation process. This cooled water is used, in turn, in heat-exchange equipment to cool other liquids and gases. The tower is packed with an open checker work of wood or metal. Hot water splashes down over the packing into a pool at the bottom. Air, by either natural, forced, or induced draft, contacts the water counter currently. Performance of the tower is at a maximum at water rates of 2 to 3 gallons per minute per square foot of ground area. General aspects of tower design are discussed. Cooling towers used in conjunction with equipment processing hydrocarbons and their derivatives are potential sources of air pollution because of possible contamination of water. A survey of the oil refineries operating in Los Angeles County indicated hydrocarbon concentrations of approximately 20 percent in the cooling water of the cooling towers. Individually the emissions varied from 4 to 1,500 pounds per cooling tower per day. The amount of hydrocarbon present in the water depends upon the state of maintenance of the process equipment, particularly the heat- exchange equipment, condensers, and coolers through which the water is circulated. The control of hydrocarbon discharges or of release of odoriferous compounds at the cooling tower is not practical. Instead, the control must be at the point where the contaminant enters the cooling water. Hence, systems of detection of contamination in water, proper maintenance, speedy repair of leakage from process equipment and piping, and good housekeeping programs in general are necessary to minimize the air pollution occurring at the cooling tower. Greater use of fin-fan coolers can also control the emissions indirectly by reducing or eliminating the volume of cooling water to be aerated in a cooling tower.

09843

Kinsey, Robert H.

MISCELLANEOUS SOURCES. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 675-678, 1967. GPO: 806-614-30

A number of relatively minor sources of air pollution contribute approximately 10 percent of the total hydrocarbon emissions to the atmosphere from refineries. Six of these sources, not discussed elsewhere in this manual, include airblowing, blind changing, equipment turnaround, tank cleaning, use of vacuum jets, and compressor engine exhausts. In certain refining operations, air is blown through heavier petroleum fractions for the purpose of removing moisture or agitating the product. The exhaust air is saturated with hydrocarbon vapors or aerosols. Emissions from airblowing for removal of moisture, or for agitation of products may be minimized by replacing the airblowing equipment with mechan- ical agitators and incinerating the exhasut vapors. Refinery op- erations frequently require that a pipeline be used for more than one product. To prevent leakage and contamination of a particular product, other product-connecting and product-feeding lines are customarily 'blinded off' by inserting of a flat, solid plate between two ranges of a pipe connection. In opening, or breaking, the flanged connection to insert the blind, spillage of product in that portion of the pipeline can occur. Emissions to the atmosphere from the changing of blinds can be minimized by pumping out the pipeline and then flushing the line with water before breaking the flange. Spillage resulting from blind changing can also be minimized by use of 'line' blinds in place of the common 'slip' blinds. Line blinds do not require a complete break of the flange connection during the changing operation. Data indicate that slip blinds spill an average of 5 gallons per change compared with line blind valves, which spill an average of 2 gallons per change. A major phase of a maintenance program is the shutting down and starting up of the various units, usually called a turnaround. Vapors removed from equipment prior to maintenance or cleaning should be condensed, recovered, or burned. Vacuum jet exhausts must also be treated if hydrocarbon vapors are present.

09857

D'Imperio, Joseph

OIL AND SOLVENT RE-REFINING. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS- Pub-999-AP-40, p. 799-801, 1967. GPO: 806-614-30

Used lubricants, hydraulic fluids, and solvents are purified to produce usable products by re-refining techniques. Because the profit margin is small there is very little effort or money spent on pollution control in re-refining plants. Odors and hydrocarbon vapors are frequently released without control. A simple control technique is to enclose all emission sources and incinerate the exhaust gasses in boiler fireboxes.

09922

Burnhouse, W. A.

HYDROGEN SULFIDE AND MERCAPTANS AS AIR POLLUTANTS. American Petroleum Institute, Detroit, Mich., Committee for Air and Water Conservation, ((16))p., 1966. 8 refs. (Presented at the American Petroleum Institute, American Institute of Chemical Engineers National Meeting, Detroit, Mich., Dec. 8, 1966.)

The emissions of hydrogen sulfide and mercaptans from petroleum operations and methods for control are given a general discussion. The specific sources of both compounds in refining operations are discussed. The control processes used for hydrogen sulfide include; scrubbing processes, heat regenerative methods, and absorption with various solutions. Several of these methods currently being used are discussed. There are many processes for removing mercaptans from petroleum products for which a very brief discussion is given. The recovery of sulfur as a control process is described. The cost of sulfur control to the petroleum industry is discussed.

11740

Schaefer, Manfred

NEW REFINERY IN THE SAAR. ((Die Saarland-Raffinerie.)) Text in German. Erdoel Kohle (Hamburg), 21(6):331-334, June 1968.

Prevention of water and air pollution is one of the subjects discussed briefly in a detailed description of the new refinery erected in 1967 near Saarbrucken, German. The refinert is a top-distillation plant with a capacity of 2 million tons per year, producing straight-run gasoline, light and heavy fuel oils, diesel oil, and refinery gas. In order to protect the neighborhood, the smoke from the tubular still (which has a capacity of 30 million kcal./hr.) is voided through a 90-meter stack, the height being calculated on the basis of the use of fuel oil with a sulfur content of 2.5%; in actual practice, the fuel oil used contains less sulfur, and gas from the stabilizing column is also used as fuel for the furnace. Escape of hydrocarbons is prevented by connecting the safety valves of the still to the discharge or torch system of the furnace. The more volatile products are stored in tanks with floating roofs. The waste water is also treated to remove volatile compounds, which are burned in the furnace, and is then led to a closed API separating tank.

17943

Belov, K. A. and L. N. Petrova

REDUCING BENZOLE HYDROCARBON LOSSES TO ATMOSPHERE. Coke Chem. (USSR) (English translation from Russian of: Koks i khim.), no. 9:32-36, 1968.

The saturated vapor pressures and volality of crude benzoles and rectification products at two coke and chemical works were experimentally determined. The saturated vapor pressures were determined at temperatures between -15 and +30 C. A three-neck flask was used which was controlled by a thermostat to maintain a constant temperature. When the required temperature was reached, 10 ml of the test substance injected into the flask and the pressure change recorded. The relationship between saturated vapor pressure and temperature was described by the equation lgP equals A - B/T, where P is the pressure of the saturated vapor in mm Hg, T the temperature in degrees Kelvin, and A and B are constants which were found experimentally. Benzene hydrocarbon losses through the breather valves in storage tanks are largely governed by the rate at which the latter are charged and the speed at which the air space in the tanks becomes impregnated with hydrocarbon vapors. To determine the quantity of these losses, 250 ml of benzene was poured into a vessel, the proper temperature was adjusted, and atmospheric air was allowed to enter. The escaping hydrocarbon vapors were caught by activated charcoal. The increase of weight of the activated carbon divided by the volume of air expelled by the vapors from the vessel yields the amount of hydrocarbons lost from the container. The error of this method did not exceed 0.5%.

26506

Tan, Soen H.

FLARE SYSTEM DESIGN SIMPLIFIED. Hydrocarbon Process., 46(1): 172-174, Jan. 1967.

A flare facility, particularly the flare burner, must have a stable flame capable of burning hydrocarbon vapors released during a major operational failure. In addition, the vapors must be sufficiently freed from liquid droplets before entering the stack, the smoke minimized by injection of steam into the flame, and the stack located at a safe distance from personnel and equipment. Finally, the flare system must be purged with inert gas to prevent flash flashback. Equations are given for computing flare stack and knockout drum size, flame radiation, and steam rate and purge gas rate. Nomograms are included to speed these design calculations.

27719

Hopper, W. C. and B. Rayzacher

THE IMPACT OF THE OIL INDUSTRY ON THE ENVIRONMENT, 2ND EDITION. Stichting Concawe, The Hague (Netherlands), Rept. 4/70, 19p., March 1970. 12 refs.

The environmental impact of refining operations and oil products is assessed. While super tankers represent a very great potential for pollution, the industry is generally careful to minimize oil losses during transportation--both at sea and overland. The problem of odors can be reduced by good maintenance and should gradually diminish with the introduction of modern refining techniques and engineering innovation. Many refineries are reducing sulfur dioxide emissions by recovering sulfur from hydrogen-sulfide gas streams. The sulfur-free gas is used to recover butane or for reforming to domestic gas or for the production of liquefied petroleum gas. The problems of refinery water effluent and refinery noise are complex, the former sometimes calling for biological oxidation or cooling-water recycle systems and air cooling. Noise is difficult to mask since most refinery equipment, for safety reasons, is operated in the open air. New engineering solutions must be found. With respect to petroleum products, there is already a steady downward trend in the sulfur content of fuel oils. This is due to the increasing availability of low-sulfur crudes and gradual changes in the refining pattern in response to changing demands for products.

28501

Shalamberidze, O. P. and S. E. Partskhalava

SANITIZING THE AIR IN THE GEORGIAN SSR. Gigiena i Sanit., no 4:96-98, 1970. Translated from Russian. Joint Publications Research Service, Washington, D. C., 5p., June 11, 1970. NTIS: JPRS 50713

The rapid industrial growth of the Georgian Republic has created serious air pollution problems. Air quality measurements initiated in the early 1950's showed excessive emissions of various pollutants from, for example, a metallurgical plant complex a chemical complex producing nitrogen fertilizer and caprolactum, a ferroalloy plant, and an oil refinery. Nitrogen dioxide and carbon monoxide concentrations as far as 2000 m from the chemical plant were higher than single and average daily maximum permissible levels. There was evidence that emissions from all these plants were having adversive effects on the health of children living nearby, and steps were taken to reduce the pollution with varying degrees of effectiveness. Air quality studies in the capital city of Tbilisi showed that control measures (e.g., removal of some industrial plants to sites outside the city, conversions to natural gas, tree planting) did succeed in reducing the sulfur dioxide, dust, and soot in the city 2- to 2.5-fold. The occurrence and effects of 3,4-benzpyrene in settling dust were studied, and maximum permissible concentrations for various compounds were established. The present air pollution control program includes systematic monitoring, preventive inspection, enforcement checks, conversion of heating and power units to natura gas, and installation of control equipment in industrial and public buildings. Nevertheless, numerous shortcoming and omissions in the program remain to be corrected for more effective control.

28874

THE TREND TOWARD HIGH CHIMNEYS RELIES ON THE TECHNIQUE OF INSULATIO TO ENSURE EFFECTIVENESS AND SAFETY. (La tendence au cheminees hautes compte sur les techniques d'isolation pour assurer l'efficacite et la securite). Text in French. Chalevr et Climats, (Waterloo), 34(406):125-128, Oct. 1969.

A 150 m tall chimney was built for a refinery which turns out petroleum products at the rate of over 750,000 barrels per day. Th chimney takes care of the waste gases emanating from the refinery, the sulfur plant, the hydrogen unit, and the steam generating system. The waste gases contain carbohydrates, sulfur dioxide, and water vapor. They enter the bottom of the chimney through three inlet ducts. The throughput of waste gases is about 1,350,000 cu m per hour at an entrance temperature at the bottom of the chimney of 375 C, with a temperature drop of 16 C between bottom and top. The insulating material must be incombustible and resistant to the wast gases, to ensure that no cracks occur which would allow corrosive gases to pass through to the outer chimney concrete structure. A cellular glass was selected as insulating material. The chimney wall, proceeding radially from outside to inside, is composed of reinforced concrete, hydrasphalte, glass insulation, an empty space of 1 cm, and an internal lining of refractory bricks. The construction provides for 11 expansion joints for lateral heat expansion. The total weight of the chimney exceeds 6000 tons, 5000 tons of which are in the outer concrete construction.

29628

LAW-MAKERS SAY: CLEAN UP OR SHUT DOWN. Can. Chem. Process., 55(4):47-50, April 1971.

The major push by the Canadian government to control air pollution will surely come once Parliament approves Bill C-224, the Clean Air Act. Under the Act, air polluters may be fined up to $200,000 per instance of violating one or more of the emission standards to be set by the Federal government. Also, the Act will empower federal authorities to fine any pollution source regardless of location; this is a major departure from current federal/provincial division of powers. Controlling the fumes from coking is mentioned, as well as regulations pertaining to the emissions from petroleum refineries, lead-in gasoline, automotive emissions, and aircraft exhaust smoke. Processes for the removal of sulfur dioxide are listed tabularly. The British Columbia government has offered a prize of $250,000 for the first individual or company to come up with a device to eliminate air pollution and odor of pulpmills.

C. MEASUREMENT METHODS

02980

L. Grupinski

THE APPLICATION OF GAS CHROMATOGRAPHY AND INFRARED SPECTROSCOPY TO THE DETERMINATION OF AIR POLLUTANTS. Staub (English TRANSL.) 25, (11) 41-4, NOV. 1965. CFSTI TT66-51040/11

The application of gas chromatography and infrared spectroscopy is described with practical examples of analysis of emissions from a pipestill chimney of a mineral oil refinery. The emissions were concentrated by a modern method. Quantitative determinations can be carried out successfully with the help of a thermal conductivity detector. Infrared spectroscopy is particularly suitable for identifying mixtures. Because of good results obtained in practice it is proposed to increase the application of gas chromatography and infrared spectroscopy to the analysis of air pollutants. (Author summary)

04324

EMISSIONS OF OXIDES OF NITROGEN FROM STATIONARY SOURCES IN LOS ANGELES COUNTY (REPORT NO. 1) (A JOINT DISTRICT, FEDERAL, STATE AND INDUSTRY PROJECT). Los Angeles County Air Pollution Control District, Calif. Feb. 1960. 55 pp.

This is the first of a series of joint project reports of work and findings on the oxides of nitrog n. The need and the recognized importance of the role of oxides of nitrogen in smog formation led to a survey of available data on the emissions of NO from stationary sources. One of the objectives of this project was to determine the rate of discharge of oxides of nitrogen from each type of equipment under varying operating conditions. Various analytical procedures for the determination of oxides of nitrogen were reviewed. Sampling and analytical procedures are discussed. The phenoldisulfonic acid method was selected because of its reliability, reproducibility, and its suitability for field test- ing. Forms used for recording field data, analytical results and calculations are contained in the appendix.

04514

G. Burkert

THE MEASUREMENT OF AIR QUALITY STANDARDS. Instr. Pract. (London) 19, (9) 831-4, Sept. 1965.

Our knowledge of air pollution is based on the experience of other countries and while it may be expected that these results could be applied to any area,the climate and geographical situation are prin cipal factors thus necessitating individual measuring standards. This paper is concerned with measurements from California and Western Germany and also describes air pollution equipment for some components of interest. The relationship between air quality and control standards is compared. (Author abstract)

04889

J. M. Lepper

PORTABLE INFRARED REMOTE S02 SENSOR (THIRD QUARTERLY S02 REPT.) Dalmo Victor Co., Washington, D. C. Apr. 10, 1967 9 pp.

This is a report of work concerning the present state of SO2 Sensor system, demonstrated capability, and problems. The SO2 Sensor has been operational for the past month and a half. During the month of January the internal computer was checked out and found to meet the requirements described in the Second Quarterly Report. The IR filters are all within specification and behave as predicted. The test tank was completed and the sensor system coefficient determination was started. Coefficient calculations were made for 2, 3, or 4-vector problems; i.e., spectral situations where 2, 3, or 4 components are in the field of view. The 2-vector situation is realized in practice when looking at plumes from natural gas burning power plants where the spectrum is dominated by CO2 and H2O with only 150 PPM of SO2 present. An example of the 3-vector problem in the field would be a fuel oil burning system with moderate amounts of SO2 being present. The 4-vector problem occurs when viewing coal burning sources with the fourth spectral component due to flyash. Field tests were begun in early March with a 2-vector calculation being done on the Pacific Gas and Electric Company's natural gas burning power plant. Further two-vector work was done at several oil refineries, primarily for signal-to-noise measurements. At this writing the equipment is disassembled for primarily optical alignment. This optical alignment consists of precision machining of the optical chassis. Although the IR optics involves only 2 mirrors and the detector, accurate alignment is necessary to insure on-axis operation. Also, alignment of the sighting telescope to the IR telescope is necessary.

09208

National Council for Stream Improvement, Inc., New York, N. Y.

A LABORATORY STUDY OF A LEAD-ACETATE-TILE METHOD FOR THE QUANTITATIVE MEASUREMENT OF LOW CONCENTRATIONS OF HYDROGEN SULFIDE. Atmospheric Pollution Tech. Bull. 15, 47p., Aug. 1962.

A simple, qualitative method for hydrogen sulfide utilizing lead acetate on the surface of a ceramic tile was evaluated on a quantitative basis in an apparatus in which low concentrations of hydrogen sulfide were maintained. The effects of hydrogen sulfide exposure, air turbulence, relative humidity dimethyl sulfide, dimethyl disulfide, methyl mercaptan and several possible interferences upon the rate of formation of colored lead sulfide on the tile surface, were investigated. Slightly exposed tiles can show a measurable response to a hydrogen sulfide concentration of 0.1 over a 6 minute time interval. The accuracy of the lead-acetate-tile method has been found to depend upon at least three factors: (a) the position of the average absorbance of the tile surfaces on the darkening curve, (b) the degree of air movement under which the hydrogen sulfide exposure is carried out, and (c) the fading of the lead sulfide color. To establish whether or not a tile surface has been overexposed, the difference between whether or not a tile surface has been overexposed, the difference between the reflectance spectrums on the curve, may be utilized. An increase in turbulence in the laboratory detention chamber has been found to increase significantly the rate of darkening. Under outdoor conditions the turbulence level in

the exposure chamber must be either standardized by an air mover or reduced to a minimum by louvering. Outdoor fading tests performed in a louvered, light-protected chamber indicate that in an 8-hour exposure period the maximum loss of Exposure Units would be in the order of 20 percent. A similar loss in Exposure Units under conditions unprotected from direct sunlight and wind would require approximately 10 minutes. The extremely high fading rate of darkening tiles exposed to direct sunlight and wind shows that hydrogen-sulfide-exposed tiles must be protected after removal from the exposure chamber as well as during exposure. The sources, effects, atmospheric concentrations and the methylene blue and A.I.S.I. sampler methods for the determination of H2S are also reviewed.

11745

INSTRUMENT SURVEY. Brit. Chem. Eng. Suppl., 13(5):13, 15-17, 19-23, May 1968.

On-stream process control depends on the rapid measurement and adjustment of process variables. A survey of instruments used in process control is presented. The analytical areas examined include: viscometry, x-ray spectrography, paramagnetic oxygen analysis, cloud and pour point analysis, gas chromatography, infra-red gas analysis, thermal conductivity, vapor pressure measurement, electrolytic conductivity, electrolytic hygrometry, liquid density measurement, pH measurement and control, ultra- violet analysis, smoke density measurement, and boiling point measurement. For the instruments applicable to each area the information presented is: variable measured, principle of measuring instrument, features of an on-line control instrument, and application examples.

16016

Marsh, K. J.

THE MEASUREMENT OF AIR POLLUTATION AROUND OIL REFINERIES. British Petroleum Co., Middlesex, England, Rept. of the Working Group 'Stack Height and Atmospheric Dispersion', Concawe, The Hague, Netherlands, 15p., Jan. 1968. 13 refs.

Principles of air pollution measurements are summarized to guide oil refineries in planning emission measurements and analyzing emission data. Pollutants considered are sulfur dioxide, hydrogen sulfide, mercaptans, smoke, solids such as grit and acid smuts, nitrogen oxides, hydrocarbons, ozone, and other oxidants. The advantages of using new commercial instruments for continous or consecutive measurements at fixed sites are contrasted with discontinuous methods using discrete samples. To determine the long-term pollution pattern around a refinery, data must be accumulated for a number of years and cumulative frequency curves derived for various concentrations of a pollutant at each measuring point. Such a curve can be used to determine the 'dosage' at each point and the damage caused by pollution. The effect of wind direction on pollution measurements must also be determined. To do this, measurements at each point are grouped according to the principle wind directions, a cumulative frequency curve is derived for each group, and concentrations obtained from the curve are plotted on vector diagrams similar to wind roses. These vector diagrams will tell whether changes in frequency distribution of pollutants are due to refinery operations or variations in weather.

17468

SOURCES OF ATMOSPHERIC SULFUR DIOXIDES AND MEASUREMENT METHODS. (Taikichu no iousankabutsu no hasseigen to sokuteihoho). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 5(10):612-620, Oct. 25, 1969. 62 refs.

Atmospheric sulfur dioxide exists in various chemical and physical forms; under normal conditions, it is in a gaseous state containing some volatile sulfuric mist and sulfate. If gaseous sulfur dioxide were the only atmospheric pollutant, its measurement would not be so difficult. The existence of sulfuric mist and sulfate and other interfering substances in the atmosphere make analytical procedures intricate. Some difficulties in analytical assessment of atmospheric SO2 are also correlated with the limits involved in technical methods, some of which, like the West-Gaeke or electroconductivity methods, are subject to error due to the existence of atmaospheric interfering elements at variance with the substantial characteristics of SO2. Therefore, in evaluating measurements obtained from applied methods and laboratory techniques, allowance must be made for sequential and accidental errors. Atmospheric values obtained with the different methods are apt to vary. The widely used analytical procedure for SO2 determination involves separating mist from sulfuric mist and measuring the sulfur in the sulfate contained in the air sample. The quantity of SO2 is determined simultaneously with the measurement of suspended sulfate is an aerosol state or contained in dust fall. In 1965, the amount of sulfurous acid gas emitted to the atmosphere was 23,400,000 t. In 1966, the amount was 28,600,000 t of which 58.2% came from coal combustion in thermal power plants; 19.6%, from oil combustion; 5.5%, from petroleum refinery processes; 12.2%, from mine refinery processes; 1.9%, from sulfuric acid production; and the rest, 0.4%, from waste incineration. Various types of SO2 analyzers, including currently improved U. S. models, are presented.

20460

Yamamoto, Tadashi, Shozo Matsuda, Toshihide Okuno, Hideki Tanaka, and Masahiko Tsuji

OFFENSIVE ODORS. 5. ANALYSIS OF THE CONSTITUENTS OF OFFENSIVE ODORS EMITTED FROM PETROLEUM REFINERIES. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 2(1):48-59, 1967. Translated from Japanese. 3p.

An analysis of the offensive odors emitted by petroleum refineries is discussed. The samples which were analyzed included liquid fractions of petroleum collected and separated from an ejector drain of a reduced pressure distillation device; contact tower drainings from the sulfuric acid washing process; and odor constituents collected by active carbon adsorption. Gas chromatography was used for the analyses. The first two samples were heated to 40 C, and a definite quantity of the gas in the container was directly introduced into the gas chromatograph for qualitative analysis. More than 30 hydrocarbons were identified. For the confirmation of these components, the elimination process with H2SO4 and other chemicals was conducted at the same time. A comparative analysis of the gas volumes evolved at different temperatures of the sample was conducted by varying the heating temperature. The third sample was also analyzed by gas chromatography, and when compared with the other constituents, a correlation was found between the detected constituents. The low-boiling hydrocarbons showed qualitative agreement, but the high-boiling ones gave inconclusive results.

21859

Okita, T., R. Sugai, and I. Kifune

SAMPLING AND ANALYSIS BY FILTER METHOD OF MALODOROUS GASES IN THE ATMOSPHERE. (Akooshu

no sokootei V Loshishiki sampler ni yoloo yuki ioh kagohbootsoo no hoshu boonsekihon no kentoh narabini ryukasooiso oyobi aldehyde rooi sokootei eno ohyoh). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):118, 1969. (Proceedings of the Japan Society of Air Pollution Annual Meeting, 10th, 1969.)

To determine malodors in the environment, filter type sampler for sampling organic sulfur compounds using mercury compounds was earlier introduced. Since then, the following items on sampling and analysis, by means of gas chromatography, of ethyl mercaptan, methyl mercaptan, and dimethyl sulfide were examined. In the process of the analysis (sampling, separation, and concentration), moisture should be removed before concentrating the sample with potassium carbonate and soda lime. The velocity in concentrating the sample with liquid oxygen is 0.2 l/min. The retention time of each sample gas can be remarkably reduced if the column temperature is 47 C, the flowrate of a carrier gas (N2) 30 l/min, and the column length 2.25 m. The reproducibility of this method is approximately 6% in terms of variation coefficients. Filters compared (Tohyoh No. 6 filter, AAWP millipore filter, and glass fiber A filter) show the collection efficiency from 44% to 100%, depending on the gases. This method is applied for gases in the water and the air polluted by waste from pulp and petroleum refining industries to show 6.0-7.8 ppb of methyl mercaptan, 2.9-3.7 ppb ethyl mercaptan, and 5.1-7.2 ppb of dimethyl sulfide in river water and 4.0-5.2 ppb of methyl mercaptan and 2.3-3 ppb dimethyl sulfide in the air.

22108

Seidman, Edwin B.

DETERMINATION OF SULFUR OXIDES IN STACK GASES. Anal. Chem., 30(10):1680-1682, Oct. 1958. 9 refs.

One existing method of determining the sulfur dioxide and sulfur trioxide content of combustion gases requires absorption of the gas sample in a known amount of industrial base. After absorption, excess base is titrated and total sulfur oxides are obtained by the difference. The sulfur trioxide is then precipitated as benzidine sulfate, redissolved, and titrated. Sulfur dioxide is determined by the difference. Ammonia and nitrogen oxides present in catalytic cracking gases interfere with the sensitivity of the method. Even when no interfering substances are present, the method is difficult to apply to refinery stack gases since the colorimetric titration end point is frequently obscured by dark-colored oxidation products from inhibitors present in the absorber solution. Also the solubility of benzidine sulfate in water severely curtails washing of the precipitate. In an improved method, sulfur trioxide in stack gases as low as 0.001% gas volume can be determined in as much as 0.3% gas volume sulfur dioxide. Ammonia and/or nitrogen oxides do not interfere. Sulfur dioxide is absorbed quantitatively in an 80% isopropyl alcohol solution, which inhibits oxidation of sulfur dioxide. The sulfate is titrated with 0.01 N barium chloride in a solution of 80% isopropyl alchohol, with Thorin used as the indicator. The end point is sharp and reproducible, and the titration is rapid. A modification of this procedure is suitable for the determination of total sulfur oxide.

22958

Wohlers, Henry C.

ODOR INTENSITY AND ODOR TRAVEL FROM INDUSTRIAL SOURCES. Intern. J. Air Water Pollution (London), vol. 7:71-78, 1963. 4 refs.

Odor surveys were completed of stack effluents and in the vicinity of a petroleum coking plant, a kraft-paper mill, an onion and garlic dehydrating plant, and a retrogravure printing plant. Gas samples were taken by the evacuated bulb technique or by passing sufficient stack gas through a bottle to replace the original air in the bottle. Threshold measurements were made with an osmoscope consisting of two telescoping metal tubes complexly arranged for odor dilution with clean air. The odor intensity in the environs of the industrial plant was determined subjectively while driving in a car at constant speed (30-35 mph) with the wind-wing of the driver's window open so that the oncoming air was directed at the face of the observer. When the extent of the odor travel from these plants was compared with the calculated threshold dilution of the stack gases according to Sutton's equation, the odor measurements at the stacks did not agree in all cases with the calculated dilutions at the distances in the field where the odors were noted. Unless the diffusion coefficients are experimentally determined, the Sutton equation should not be used for distances greater than 2 miles; at distances greater than 1 or 2 miles under unstable conditions, the stack height, the exit velocity, and the temperature of the exhaust gases no longer seriously affect the plume axis concentrations. The osmoscope, which assumes the validity of the Weber-Fechner law, had an error of no larger than about 25%. The consequence of the logarithmic relation of this law is that a 10-fold reduction in odor concentration makes a scarcely perceptible alteration in the strength of the odor. This relation must be considered in making field odor surveys. It is suggested that these results are another example of only partially diluted stack gases moving as discrete eddies through the atmosphere. (Author abstract modified)

D. AIR QUALITY MEASUREMENTS

03170

VISIBILITY AT MUNICIPAL AND FAIRFAX AIRPORTS (KANSAS CITY, KANSAS - KANSAS CITY, MISSOURI AIR POLLUTION ABATEMENT ACTIVITY). Public Health Service, Washington, D.C., National Center for Air Pollution Control. Jan. 1967. 78 pp.

An investigation of air pollution and its effects upon visibility in the vicinity of Kansas City Municipal and Fairfax airports was conducted in Kansas City, Missouri and Kansas City, Kansas during the summer of 1966. The survey area includes those portions of Platte, Clay and Jackson Counties in Missouri, and of Wyandotte County in Kansas which lie within about 3 miles from the airports. The air quality survey of this investigation include measurement of the concentrations of suspended particulates and soiling index at four locations in the vicinity of the two airports. The average concentration of suspended particulates was about 100 micrograms per cubic meter and the average soiling index was about 0.6 COH unit per 1000 feet. Earlier investigations reported by others have shown the average annual concentrations of particulates in the Kansas City metropolitan area to be greater than the concentrations observed in the summer season. Records of observations made at the two airports show occurrences of smoke and of reduced visibility in which smoke is a factor. Records of meteorologic conditions show winds from all directions and the movement of polluted air from either state to the other. An inventory of emissions of particulate pollutants in the survey area surrounding the airports was made. From this inventory it is estimated that more than 55,000,000 pounds of particulate pollutants are emitted each year from sources in the survey area. Approximately four-fifths of this total is emitted from sources in Kansas and one-fifth from sources in Missouri. Twenty-one point sources account for almost 85 percent of the total particulate emissions from all sources in the survey area. Mathematical application of diffusion and transmittance theory to data on source emissions and meteorologic parameters yield results consistent with observed visibility reductions and show the relative impact of individual sources. (Author summary)

03404

D. S. Mathews J.J. Schueneman

MANAGEMENT OF DADE COUNTY'S AIR RESOURCES. Public Health Service, Cincinnati, Ohio, Division of Air Pollution. (In cooperation with Florida State Board of Health and Dade County Dept. of Public Health, Fla.) Oct. 1962. 43 pp. HEW

Metropolitan Dade County has a long history of being a desirable area in which to live, work, and play. A great subtropical agricultural industry abounds. Tourism is one of the largest income producing industries in this area. Population and urban development are increasing rapidly. In general, these trends have to reduce agricultural income. Due to the dominance of tourism and agriculture, economic return has been somewhat uncertain ahd has not been balanced equally throughout the year. To compensate for this situation, a significant effort is being put forth to bring new kinds of income producing activities into Dade County. A specific proposal has been made to construct and operate a petroleum refinery near Homsestead as part of an extensive industrial development. The Dade County Manager and the Dade County Department of Public Health requested technical assistance from Florida State Board of Health and the United States Public Health Service in reviewing the refinery proposal, evaluating it spossible environmental effects and in planning a long range air resource management program. Air pollution aspects are considered and presented herein. (Author introduction modified)

03451

BI-STATE STUDY OF AIR POLLUTION IN THE CHICAGO METROPOLITAN AREA. Indiana State Board of Health, Illinois Dept. of Public Health, Springfield and Purdue Univ. Lafayette, Ind. 1959. 151 pp.

The population of the Chicago area, as a whole, has evidently not yet experienced great inconvenience because of air pollution. However, with the increased growth of the area both population-wise and industrially it is important that knowledge of the present conditions be obtained to protect the public well-being and to prevent future conditions that may have an adverse effect upon the citizens of the area. Some of the conclusions resulting from the Bi-State Study of Air Pollution in the Chicago Metropolitan Area are: (1) The Chicago Area is an extensive heterogeneous area consisting of a complexity of domestic, commercial, and industrial activities which emit a variety of foreign materials to the atmosphere; (2) Air pollution problems may transcend local boundaires and require intercommunity cooperation for their solution; (3) Prior studies show an early awareness of the presence of foreign materials in the atmosphere in concentrations varying with local and meteorological conditions; (4) The probable major contributors of material to the air in the Chicago Metropolitan Area and their probable major emissions are: (a) Poor community housekeeping - wind-generated particulate matter; (b) Burning of refuse in open dumps and backyard incinerators-products from incomplete combustion of organic and inorganic matter; (c) Residential and small commercial and industrial heating plants - products from incomplete combustion of coal; (d) Automobile exhaust - products from combustion of gasoline; (e) Electric utilities - combustion products; (f) Domestic and industrial combustion of fuel oil - combustion products; (g) Primary metals industry - particulate matter; and (h) Petroleum refineries and gasoline handling facilities - hydrocarbons.

03454

W. C. Cope, Chairman.

SMOKE AND AIR POLLUTION - NEW YORK - NEW JERSEY. Interstate Sanitation Commission, New York City. Feb. 1958, 95 pp.

Pollution in the metropolitan area was studied by: aerial reconnaissances and photography; and surveys in the communities. Significant information was collected on: relationships of meteorology, visibility and pollution; interstate movement of pollution as indicated by releasing tracer dust in one state and collecting in the other; amount of vehicle exhaust fumes and

other organic materials in the air; sulfur dioxide concentration on Staten Island, and ozone on Staten Island and in Carteret, N.J.; effects of the polluted atmosphere on health, vegetation, materials and transportation; and a study and evaluation was made of existing laws in the State of New York, New Jersey and Connecticut, and other jurisdictions. Air pollution originating in regions of New York and New Jersey within the New York Metropolitan Area is interstate in character, affects public health and comfort adversely, and damages property. While the control and abatement of air pollution at its sources is the primary obligation of the states, counties or municipalities in which it originates, the problems of interstate air pollution cannot be solved wholly by governmental agencies independently of one another. The abatement of existing interstate air pollution and the control of future interstate air pollution is of prime importance to the persons living and industry located in the area affected thereby, and can best be accomplished through the cooperation of the states involved, by and through a common agency or instrumentality. An interstate instrumentality, employing the administrative practices followed by the Interstate Sanitation Commission in the abatement of interstate water pollution, should be created to deal with the problems of interstate air pollution. Drafts of proposed legislation to meet the situation described in this report should reflect fully the opinions and needs of many agencies, local governing bodies, members of the Legislatures, representatives of industry, and of the public. There has been insufficient time between the completion of the study and the submission of this report to afford opportunity to interested agencies to express their views on the form which legislation to abate interstate air pollution should take.

03505

M. D. Hornedo and J. H. Tillman

AIR POLLUTION IN THE EL PASO, TEXAS AREA. El Paso City - County Health Unit, Texas. 1959. 104 pp.

The primary purpose of this study was to obtain basic scientific air pollution data concerning the type, extent, source, and effect of the waste from industry and other air pollution in the El Paso area. Another purpose was to determine the need and nature of a permanent air pollution control program. The scope of the program was limited by two factors; the gathering of those samples which were within our means to analyze and the collection of pollutants commonly found in any city.

07830

Popov, V. A.

THE PRESENCE OF OXIDANTS IN THE ATMOSPHERE OF CERTAIN TOWNS IN THE U.S.S.R. ((Prisultstvie oksidantov v atmosfernom vozdukhe nekotorykh gorodov SSSR.)) Text in Russian. Engl. transl. Hyg. Sanit., 31(1-3): 3-8, Jan.-March 1966.

Oxidants in the air of certain towns of the Soviet Union were measured by the phenolphthalein method. The standard color scale was a mixture of an alcoholic-aqueous solution (3:2) of phenolphthalein and 1% borax solution. The maximum concentration of oxidants on the highways of Moscow and Baku on sunny days was as high as 0.1 mg/cu m, and on cloudy days did not exceed 0.03 mg/cu m. A study of this type of pollutants in Baku revealed their presence in the area of oil refineries at concentrations within 0.15 mg/cu m. On the other hand, the maximum value of oxidants in the vicinity of Batumi oil refinery was considerably lower (0.04 mg/cu m).

08198

Stankevich, B. E. and M. I. Isaeva

SELECTION OF AIR INTAKE POINTS FOR VENTILATION OF PREMISES IN PETROLEUM PROCESSING PLANTS. Gigiena i Sanit., No. 8:27-34, 1954. Translated from Russian by B. S. Levine, U. S. S. R. Literature on Air Pollution and Related Occupational Dis- eases, Vol. 4, p. 202-208, Aug. 1960. CFSTI: TT 60-21913

Previous investigators had concluded that even under most unfavorable conditions of refinery building location with regard to hydrogen sulfide accumulation, the air intakes located 18 - 20 m above the ground could supply air sufficiently pure for practical ventilation. In an effort to disprove this conclusion, studies were made at two petroleum refineries. Air samples taken simultaneously at 5, 10 and 15 m above the ground were analyzed for the content of hydrogen sulfide, hydrocarbons, carbon monoxide and sulfur dioxide. It was found that the installation of air intakes at 15 - 20 m fails to improve the quality of ventilation air, and in many cases might worsen it. In view of the complexity and specific conditions which may exist in some modern oil refineries, the choice of necessary sanitary measures can be made only on an individual basis by taking into consideration actually existing conditions.

09591

Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control

NEW YORK - NEW JERSEY AIR POLLUTION ABATEMENT ACTIVITY: PARTICULATE MATTER. PHASE II. PRE-CONFERENCE INVESTIGATIONS. 206 p. Dec. 1967. ((15)) refs.

An investigation of particulate matter air pollution conducted in the New York - New Jersey metropolitan area in 2966 and 1967 is reported. The report includes these topics: History of Abatement Action; Description of Study Area; Climatology; Project Design; Air Quality Data; Particulate Emission Inventory; Meteorological Representativeness; Impact of Particulate Pollution on Study Area; Summary of Particulate Air Pollution Standards, Criteria, and Objectives; Comparison of Current Levels with Standards or Objectives; Anticipated Reductions in Particulate Emissions; Conclusions and Recommendations of Interstate Air Pollution - New York - New Jersey Metropolitan Area, January 1967; Aerometry Operations and Techniques; Emissions Inventory Procedure; and Pollutant Measurement Data.

10128

G. Swanson

MICROSCOPICAL ANALYSIS OF SUSPENDED PARTICULATES IN DENVER AIR POLLUTION. In: Further Studies of Denver Air Pollution. Colorado State Univ., Fort Collins, Colo., Dept. of Atmos- pheric Science, AS-105, p. 109-145, Dec. 1966. 14 refs.

Results of microscopical analysis of suspended particulates in the Denver air are discussed. The study was a preliminary on in to evaluate the feasibility of identification of suspended particulates in situ. The major sampling site was located close to the center of the city of Denver. The greatest density of potential sources lies in a northerly and northeasterly direction from the sampling site. Located in the area are pulverized-fuel users, refinery operations, ceramic tile manufacturers, feed pro- cessing operations, fertilizer plants, paint manhfacturers, oil combusters, and paper processing plants. Suspended atmospheric particulates were collected on a 47 mm (960 mm2 effective area, Millipore ADM-30, 1966) membrane filter, pore

size 0.45 micron. The filter was retained in a stainless steel 'open-type' filter holder containing a 10 liter per minute limiting orifice. The analysis relied on morphological identification and simple chemical microscopical techniques. It was found that wind changes and inversion conditions affect the composition of sample as well as the size distribution.

10306

P. Sutton

AIR POLLUTION IN PETROLEUM REFINING. (PART 3.) Chem. Process Eng., 49(4):103-106, April 1968. 10 refs.

A method for calculating ground level concentration from stack emissions is discussed in detail. Graphs are presented to aid in the calculation, and factors such as emission rate, wind speed, stack height, plume rise, stack gas temperature, and distance from emission point are considered. Apparatus for measuring SO2 in the air are described including lead candle, multi-port, and continuous analyzers.

10517

Robinson, E. and R. C. Robbins

SOURCES, ABUNDANCE, AND FATE OF GASEOUS ATMOSPHERIC POLLUTANTS (FINAL REPORT.)Stanford Research Inst., Menlo Park, Calif., SRI-P 6755, 123p., Feb. 1968. 120 refs.

An analysis of the sources, abundance, and fate of gaseous atmospheric pollutants is presented, considering three families of compounds: sulfurous, nitrogenous, and organic; and two inorganic carbon compounds: carbon monoxide and carbon dioxide. With the exception of CO2, similar patterns of analyses of these materials a followed and rather detailed analyses are produced. The presentati of CO2 is only a brief review of the current state of thinking. Included are estimates of annual world-wide emissions of pollutants SO2, H2S, CO, NO2, NH3, and organics. The magnitudes of the natura emanations of a variety of materials have also been considered, although the means of estimating these emissions are very crude because so little study has been made of emissions from other than urban air pollution sources. Sulfur compounds, in the form of SO2, are currently the most topical of the numerous air pollutants. Sulfur enters the atmosphere as air pollutants in the form of SO2, H2S, H2SO4, and particulate sulfates; and as natural emanations in the form of H2S and sulfates. Among the various sources of CO, automobile exhaust accounts for more than 805 of the estimated worl wide CO emission. The major sources for the gaseous nitrogen compounds are biological action and organic decomposition in the so and perhaps in the ocean. Aerosols containing NH4 ions and NO3 ion are formed by atmospheric reactions involving the various gases. Major contributions of hydrocarbons include natural CH4 emissions from flooded paddy areas, terpene-class organics evolved by vegetation, and pollutant emissions. A brief review of present understanding of CO2 in the atmosphere indicates a clear example of situation where pollutant emissions are significant enough to cause measurable changes in the ambient concentrations.

17096

Selegean, Elena, M. Cucu, C. Anghelescu, I. Ardeleanu, C. Botezatu, M. Dargenta, A. Lucinescu, Olimpia Popa, Zamfira Stanescu, and N. Manea

INVESTIGATIONS ON THE OXIDIZING POTENTIAL OF THE AIR IN 4 TOWNS IN THE SOCIALIST REPUBLIC OF RUMANIA. (Cercetari cu privire la potentialul oxidant al aerului din 4 orase din Republica Socialista Romania). Text in Romanian. Igiena (Bucharest), 15(9):533-539, 1966. 16 refs.

The oxidizing potential of the air in 4 towns in Rumania was investigated over a period of 3 years. In 2 towns with large oil refineries, high 03 concentrations were found, particularly on sunny, summer days. This was probably due to the photochemical oxidation of the pollution emitted into the atmosphere. (Author summary modified)

17285

DENSITY OF SULFUR OXIDES IN ATMOSPHERE. (Iou sankabutsu no taiki chu nodo). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 5(11):670-679, Nov. 25, 1969. 32 refs.

Sulfur dioxide measurements near the point sources in steam power plants, petroleum refineries, and blast furnaces are described. The effect of sulfur oxides on the acidity of rainwater and granular substances in the atmosphere are also discussed. The density of sulfur dioxide in air was continuously measured in 8 cities in America. The sulfur dioxide concentration in Los Angeles and San Francisco was lower than in the East. The data were arranged by time intervals into mean values for five time periods: 1 hour, 8 hours, 1 day, 1 month, and 1 year. The data were also arranged into several terms, which included maximum value in a year, geometric average, standard geometric deviation, maximum and minimum value, and efficient data percentage. The measuring period was from 1962 to 1967. Air pollution was strongest in cities in the following order: Chicago, Philadelphia, Washington, St. Louis, Cincinnati, Los Angeles, Denver, and San Francisco. The plants emitting large quantities of sulfur dioxide were described as the point sources. The density changes were determined according to the change in wind, production quantity, and temperature. The relationship between sulfur dioxide density and sulfur trioxide density was also described. Sulfur trioxide density became high on a foggy day.

19508

Omichi, S. and M. Ito

THE MEASUREMENT OF HYDRO-CARBON IN ATMOSPHERE BY GAS CHROMATOGRAPH. (Gas chromatograph ni yoloo taikichu no tanka sooiso no sokootei-Sekiyu combinahto chitai ni okeloo tanka sooiso (Dai 1 poh). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):42, 1969. (Proceedings of The Japan Society of Air Pollution Annual Meeting, 10th, 1969.)

Hydrocarbon measurements were performed at a point near a petroleum refinery, a point on a highway, and a point in a commercial and residential area in the Ichihara sea-side industrial area located along the east of Tokyo Bay, to know the present pattern of its distribution. By means of gas chromatography, 17 lower boiling hydrocarbons were separated from the C3 to C5 hydrocarbons (propane, propylene, isobutane, n-butane, cis-2-butene, n-pentane, 3-methyl-1-butene, 1.3-butadiene, 1-pentene, 2-methyl-1-butene, trans-2-pentene, cis-2-pentene, 2-methyl pentene, and n-hexane.) No significant differences in a distribution pattern of hydrocarbons at these three points were found. Only 8 hydrocarbons were found in the commercial and residential area in the night; these showed low concentrations.

21192

Yoshida, Katsumi, Yoshikazu Takatsuka, Hidehiko Oshima, and Masayuki Imai

EVALUATION AND EFFECTS OF AIR POLLUTANTS IN SPECIAL AREA. ON THE CASE OF PETROLEUM-COMBINATE. (Tokushu chiiki ni okeru taiki osen busshitsu no hyoka to eikyo. Sekiyu kogai no baai). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 2(2):138-140, Aug. 31, 1968. 7 refs.

A survey of air pollution in Yokkaichi indicated that the total volume of falling dust particles in the area was not always large compared to that of other industrial areas and that the percentage of soluble components in the total volume had increased. The increase is due mainly to the sharp rise of SO4 values in the air. Since 1961 pH values in deposited rainwater in Yokkaichi have continued to decrease. High SO2 emissions from various industries, including a petroleum combine, are responsible for the strong acidification of the air and contribute to chronic bronchitis and bronchial asthma. The analysis of atmospheric sulfur oxide by the glass fiber filter method showed that 64% of SO2 in the air was gathered by filter; almost all of this was recovered as SO4(-2). Sulfur trioxide is present in the air mainly as an isolated sulfuric acid mist. Chronic bronchitis was in parallel relationship with dust fall in a limited area, while bronchial asthma was parallel with the SO2 level. Yokkaichi asthma differs from asthma in other areas in its allergic properties. There were also many cases of chronic bronchitis without asthmatic symptoms in Yokkaichi. The frequency of high-density SO2 and by the correlation between sulfuric acid mist and air pollution are phenomena peculiar to Yokkaichi. Other pollutants observed included vanadium, nitrogen dioxide, and pentachlorophenal.

26563

Hamamura, Norikatsu, Ayamichi Sigeta, Yoichi Takaya, Motoichi Kondo, Hirokatsu Okada, and Sadako Komatsubara

STUDIES ON AIR POLLUTION OF NEW DEVELOPING INDUSTRIAL CITY MIZUSHIMA, OKAYAMA PREFFCTURE. (Okayama-ken minami shinsangyotos Mizushima chiiki ni okeru taiki osen). Text in Japanese. Okayama-Ken Eisei Kenkyusho Nenpo (Ann. Rept. Hyg. Lab. Okayama Prefect.), no. 15:123-145, March 1968.

Mizushima area in Okayama Prefecture is a newly developed industria city with a petroleum chemistry and iron and steel factory area on the side of the sea; the south-south-western wind blows often. The direction of the wind of 6 m/sec is mostly from the sea. This area is under such bad conditions that the wind blows in limited direction for several hours continuously. A survey was made on the amount of falling soot and dust (British standard deposit gauge was used) and concentration of sulfur dioxide (by lead dioxide method) from 1965 through 1967. Falling soot and dust is abundant from spring to summer; its average was 5.8 t/sq km/month. Concentration of SO2 was high from spring through summer and generally it was low in autumn. It is increasing year after year: 0.38 SO3 mg/day/100 sq cm in 1965; 0.48 SO3 mg/day/100 sq cm in 1966; and 0.51 SO3 mg/day/100 sq cm in 1967.

27673

Hiroshima Prefectural Government (Japan), Dept. of Hygiene

AIR POLLUTION IN HIROSHIMA PREFECTURE. 1ST REPORT. (Hiroshima- ken ni okeru taikiosen. Dai 1 po). Text in Japanese. 374p., Feb. 1970.

Air pollution caused by soot and dust has become a social problem in Hiroshima Prefecture, both in Otake city (where the main industries are paper manufacturing and petrochemicals) and in Kure city (with iron and steel and shipbuilding industries). Environmental investigations were carried out by the municipal authorities concerned, and fundamental investigations by the prefectural authorities, in order to designate the polluted areas as defined under the anti-pollution law. Based on the results of these investigations, Otake city was designated as suffering from air pollution from March 1968, and Kure city from March 1969. The extent of air pollution has subsequently been kept under continuous surveillance. This report describes the results of the fundamental survey of the designated areas carried out by the prefectural authorities, and the basic survey of air pollution carried out by the municipal authorities, divided into regional groupings of 8 districts in Hiroshima Prefecture (Otake, Kure, Fukuyama, Mihara, Hiroshima, Onomichi, Takehara, and Fuchu city). The results of controls established under the anti- pollution law and a survey of specific harmful substances are also given.

28325

Murata, Motohiko, Hiroshisa Shima, T. Matsui, Hiroshi Hirobe, Tsuyoshi Kanamaru, and Kuniaki Naka

AIR POLLUTION IN YOKKAICHI CITY. PART III. ON SULFUR OXIDES IN SUSPENDED DUSTS. (Yokkaichi no taiki osen. Dai-3-po. Fuyufunjinchu no iosankabutsu nitsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):199, 1970. 2 refs. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Sulfur oxides in suspended dusts were measured in the Shiohama district of Yokkaichi where petrochemical industries are a source of air pollution. Air was sampled by a high-volume air sampler for 24 hours, collected on glass-fiber filters, and analyzed. The amount of sulfuric acid in the sulfate ion was measured by the Commins method. In addition, sulfur oxides were collected in a special saltwater solution, and 24-hour average concentrations of sulfur dioxide and the sulfate ion were calculated by Watanabe's method. Except for one location, sulfuric acid in the sulfate ion was about 30%. The sulfuric acid-sulfate ion ratio was in percentage multiplied to the sulfate ion value obtained from the saltwater collection, and correlated with the sulfate ion value. A correlation at 1% significance level as found for two locations.

28326

Murata, Motohide, Hiroshisa Shima, T. Matsui, Hiroshi Hirobe, Tsuyoshi Kanamaru, and Kuniaki Naka

AIR POLLUTION IN YOKKAICHI CITY. PART II. RESULT OF INVESTIGATION OF SUSPENDED DUSTS. (Yokkaichi no taiki osen. Dai-2-ho. Fufyufunjin no chosakekka ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):198, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Suspended dusts in Yokkaichi were analyzed for metallic elements and their general distribution. Items studied were average, maximum, and minimum values (micrograms/cu m) of total suspended dust, the sulfate ion, the nitrate ion, iron, manganese, lead, copper, titanium, vanadium, and phosphorus. The nitrate ion was not found in sufficient quantity to be of concern. The nitrate ion was not found in sufficient quantity to be of concern. Lead averaged 0.4 micrograms/cu m in the area of heaviest traffic volume. Phosphorus had only one emission source and was convenient for observing distribution. In general, concentration decreased with distance from the source. The sulfate ion and vanadium had a similar distribution, and both were relatively high in one location, the vicinity of a petrochemical complex.

28835

Yamaguchi Prefecture Research Inst. of Health (Japan)

ON THE AIR POLLUTION IN WAKI, KUGA COUNTY. PART IV. (Kuga-gun Waki-mura no taiki osen ni tsuite. Dai-4-po). Text in Japanese. Yamaguchi-Ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. of Health), no. 11:48-49, Aug. 1968.

Air quality data obtained in Waki, Japan, from January to December 1968 are presented. The maximum value of sulfur

dioxide was 1.31 mg SO3/day/100 sq cm lead peroxide, obtained in April at Waki Junior High School. The annual average sulfur dioxide concentration was 0.78 mg. Settling dusts, on the other hand, were at the maximum, 8.9 tons/sq km/month, in July at Waki Junior High School, and the annual average was a relatively low 5.3. It is concluded that air pollution in Waki is mainly of the petrochemical industry type, and is very similar to that in the neighboring city of Iwakuni.

30860

Murphy, R. P.

AIR POLLUTION CONTROL IN NEW SOUTH WALES. Preprint, Dept. f Public Health, Sydney (Australia), Air Pollution Control Branch, 20p., 1970 (?).

All Australian state governments, with the exception of Tasmania, have passed air pollution legislation. The federal Clean Air Act established an Advisory Committee, fees, administration, regulations setting up emission standards, and licenses. An Air Pollution Control Branch was established with 10 engineers, four chemists, two technical officers, seven field assistants, and one laboratory attendant to implement the Act, monitor pollution, and research the problem. Stacks were sampled and analyzed by chemistry, spectroscopy, chromatography, and other means. New monitors have been developed including a sulfur dioxide colorimeter and a portable gas calibration apparatus. Three Clean Air Conferences have taken place, and a Clean Air Society was formed. Air pollution was monitored in Sydney and nearby cities. Dust fall improved over the years, while smoke density and sulfur dioxide concentrations have varied. Insoluble solids ranged from four tons/sq mi/month at purely residential sites to up to 60 tons sq mi/month at industrial sites. Average daily values of SO2 and smoke density were determined by hydrogen peroxide and paper tape clamps, respectively, at a series of monitoring stations. Also, continuous SO2 monitors were installed operating on the conductivity principle, but these were unsatisfactory for low concentration measurements. Hourly smoke haze results between 1960 and 1967 showed a reduction in the frequency of smoggy days and in the maximum hourly and daily values. Automobile exhaust was monitored close to Sydney traffic lanes; carbon monoxide ranged from .2% to 10% and could be lowered by adjusting the idling speed; aldehydes (formaldehyde), nitric oxide, nitrogen dioxide, lead, hydrocarbons (as methane), and other particulates were also measured. The cost of air pollution control in New South Wales was determined by a survey of various industries. The total expenditure for five years (1963-1968) was 39,910,000. Iron and steel companies spent 34.2% of the total and electric power suppliers spent 28.2%. The cost per person per year was $1.89. Other industries included boilers, cement, metallurgical, milling, chemical, oil refining, and gas. Various factors influencing pollution dispersion were studied including inversions, seasons, topographical interactions, and so on. The effect of weather conditions on smoke in the Sydney area was studied; air pollutants emitted to the west of Sydney during inversions increased the maximum values recorded at Sydney or extended the period during which high values occurred. Various analytical instruments are listed.

30970

Oita Prefectural Government (Japan), Public Nuisance Section

MEASUREMENT OF AIR POLLUTION. (Taikiosen no sokutei). Text in Japanese. In: The Outline of Policy Against Environmental Pollution in Oita City. 1969 Fiscal year. (Oita-shi kogai gyosei no gaiyo. Showa 44 nen). Oita, Japan, March 1970, Chapt. 5, p. 42-89.

Measurements of the concentration of sulfur dioxide and the amount of dust fall in 1969 are reported. The monthly mean concentration of sulfur dioxide at six measuring points ranged from 0.02 ppm to 0.03 ppm by the conductometric method. According to the monthly changes, a high concentration was shown in summer, especially in July. When the concentration was over 0.2 ppm, the wind direction was from the sea, almost northerly, and was relatively slow at 1.5 - 3.7 m/sec; consequently, gentle wind pollution occurred. A monocyclic pattern with a peak in the day and stable through the night was observed. The mean concentration of sulfur dioxide at 15 measuring points was 0.34 mg/day by the lead peroxide method. The concentration of sulfur dioxide increased compared with the previous year due to the operation of a petroleum combine (industrial groups) and power plant. The mean dust fall at eight measuring points ranged from 4.15 t/sq km to 9.05 t/sq km by the deposit gauge method. Dust fall was most frequent from spring to early summer. The mean dust fall was 6.20 t/sq km in 1967; however, it was 7.60 t/sq km in 1968 and 7.0 t/sq km in 1969 and is still increasing. The effects of soot and smoke from many factories in the littoral district are mainly affected by the direction and speed of the wind; in the case of Oita city, they are strongly affected by a sea wind from the north. However, the measurement revealed that a land wind from the south was frequent throughout the year in Oita city.

31275

Miyahara, Atsuo, Hiroshi Matsumura, K. Yamamoto, and Kiyoshi Nishimura

RESULTS OF AIR POLLUTION INVESTIGATION IN TOKUYAMA AND NANYO AREAS: SULFUR DIOXIDE GAS AND SUSPENDED DUSTS. (Tokuyama. Nanyo chiku okeru taiki osen chosa seiseki ni tsuite. Aryusan gasu to fuyu baijin). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 11:51-53, Aug. 1968.

To prevent future air pollution problems, air quality tests were conducted in the Tokuyama and Nanyo districts of Yamaguchi Prefecture, each of which is designated a special industrial area. Sulfur dioxide was measured by the pararosaniline method and dusts were collected by a high-volume air sampler. In the Tokuyama area, stations in the neighborhood of the oil refinery in the central-eastern part of the city and a station near the soda-cement factory in the western part had the highest average concentration of sulfur dioxide (about 0.04 ppm). A similar concentration was recorded in the neighborhood of a soda factory in the eastern part of Nanyo. Measurements of suspended dusts did not show any daily variations identical to that of sulfur dioxide. The highest concentration of dusts in Tokuyama was at point near the soda- cement factory in the western part of the city.

E. ATMOSPHERIC INTERACTION

03875

D. E. Loudon

REQUIREMENTS FOR SAFE DISCHARGE OF HYDROCARBONS TO ATMOSPHERE. Proc. Am. Petrol. Inst., Sect. III. 43, 418-33, 1963. (Presented at the 28th Midyear Meeting, American Petroleum Inst. Division of Refining, Philadelphia, Pa., May 15, 1963.)

Current knowledge, opinion, and service experience relative to the disposal of released hydrocarbons, is assembled with emphasis on atmospheric discharge. Potential hazards to personnel and equipment associated with the release of hydrocarbon vapor to the atmosphere include: 1, ignition of outflow, either immediate or delayed; 2, explosive release of energy from delayed ignition; 3, flame radiation; 4, condensation of vapor; 5, noise; and, 6, pollution. The present state of knowledge relative to these hazards is discussed. This leads directly to an appreciation of aspects where general knowledge, experience data, or fundamentals are inadequate or totally lacking. The individual subjects requiring attention are summarized. (Author abstract modified)

16846

Mosher, J. C., W. G. MacBeth, M. J. Leonard, T. P. Mullins, and M. F. Brunelle

THE DISTRIBUTION OF CONTAMINANTS IN THE LOS ANGELES BASIN RESULTING FROM ATMOSPHERIC REACTIONS AND TRANSPORT. J. Air Pollution Control Assoc., 20(1):35-42, Jan. 1970. 11 refs.

Different techniques of data analysis have been successfully applied to Los Angeles County air monitoring data to delineate major source areas for carbon monoxide, sulfur dioxide, nitrogen oxides, and ozone; to develop contaminant transport patterns; and to demonstrate the progress of photochemical reactions in the Los Angeles atmosphere. The heavily industrialized South Coastal, Southwest Coastal, and East San Fernando Valley areas are most affected by contaminants derived from fuel combustion at stationary sources. Emissions from mobile sources are heavily concentrated in some of the above source areas and also in the Central area. Seasonal variations in weather affect the total contaminant emissions as well as the distribution, transport, and ultimate fate of the individual contaminants. More frequent surface inversions in winter, combined with greater quantities of emitted contaminants, result in winter time atmospheric concentrations of primary contaminants (carbon monoxide, nitric oxide, sulfur dioxide, and particulates) more than twice as high as comparable summer time concentrations. Stronger on-shore breezes of longer duration transport contaminated air parcels farther across the County during summer. Longer, more effective irradiation and low persistent inversions result in higher ozone concentrations in summer. Air monitoring data confirm the photochemical formation of ozone during transport of air parcels along the most common 'pathways' of transport--the prevailing wind flows from coast to inland areas. (Author's Abstract)

24492

Davies, Richard W.

LARGE-SCALE DIFFUSION FROM AN OIL FIRE. Advan. Geophys., vol. 6:413-415, 1959.

Observations relating to the diffusion of oil smoke from a refinery fire on a day when atmospheric conditions were unusually favorable are reported. A side view of the smoke plume gave the impression that it was shaped like a cone. It seemed reasonable to assume that the turbulence was approximately isotropic. However, the smoke tended to diffuse laterally rather than vertically. The smoke was confined mainly to altitudes ranging from 2500 ft to 11,500 ft over a 120 mile length. The wind velocities were very light up to 3000 ft. The vertical rise of the smoke shows that there was no low-level wind at all. From 4000 ft, the velocity increased almost linearly with altitude up to 12,000 ft where the magnitude was about 50 kts. The temperature gradient in this altitude range was approximately two-thirds the adiabatic lapse rate. The settling pattern of oil-smoke and droplets indicated that the energy in small-scale vertical velocity fluctuations was appreciable. Weather reports and interviews provided the information to trace the smoke for 120 miles. The plume widths were determined to within 5% over the first 20 miles. However, the meteorological data and the altitude measurements are less accurate, so that the diffusion coefficients are only accurate to within 20%.

32371

Council of Ministers (USSR), Voeykov Main Administration and Inst. for Industrial Buildings and Construction (USSR) Central Scientific Research and Experimental Project

RECOMMENDATIONS FOR THE CALCULATION OF DISPERSION IN THE ATMOSPHERE OF NOXIOUS AGENTS (DUST AND SULPHUR DIOXIDE), CONTAINED IN THE EFFLUENTS FROM INDUSTRIAL UNDERTAKINGS. Gidrometeorolog. Izdat., 1967. Translated from Russian. National Lending Library for Science and Technology (England), 49p.

A procedure for calculating dispersion in the atmosphere of dust and sulfur dioxide discharged by industrial installations and boiler plants is presented. Meteorological coefficients, ground level emissions, maximum allowable concentrations, the gas-air mixture in the flue gases, and topographic characteristics are examined. Single sources and groups of emission sources are considered and recommendations are given for calculating the background pollution of the air basin of a residential area and determining the boundaries of the health protection zone. Proposals for basic measures for protecting the air basin from pollution with the operation of industrial installations and boiler plants are presented. (Author abstract modified)

F. BASIC SCIENCE AND TECHNOLOGY

10759

Kirsch, F. W., J. D. Potts, and D. S. Barmby

A NEW ROUTE TO OLEFINS ALKYLATION. Oil Gas J., 66(29):120-124, 127, July 15, 1968.

Alkylation of isobutane and C3-C5 olefins into a high-octane motor-fuel component has conventionally made use of sulfuric acid and hydrogen fluoride catalysts. Based on research discussed in this paper, it appears that cation-exchanged zeolite, or crystalline aluminosilicate, catalysts also can be used to effect this reaction. The products are similar but not identical to those obtained by the conventional route. Among the notable differences with the solid catalysts are a lack of acid-sludge formation, desirably low 2,2,4-trimethylpentane content of normal butane alkylate, and some ability to alkylate normal butane.

23255

Setser, D. W. and D. H. Stedman

CHEMICAL APPLICATION OF METASTABLE ARGON ATOMS. IV. EXCITATION AND RELAXATION OF TRIPLET STATES OF NITROGEN. Preprint, Kansas State Univ., Manhattan, Dept. of Chemistry, 42p., 1969. 44 refs.

An argon flow system containing about 0.01% of metastable argon atoms in the absence of other energy carriers is described and characterized. The reaction of these metastable atoms with nitrogen gives a range of nitrogen radiative transitions. Absolute intensity measurements, high resolution spectra, and pressure dependence data show that the direct production of two excited states of nitrogen takes place. The mechanism for the anomalous rotational intensity alternation in one of the excited states is discussed, and rotational relaxation is shown to take place at a rate, with slower electronic quenching. Similar results are presented for a second excited state. (Author abstract modified)

32491

Romankov, P. G.

DEVELOPMENT TRENDS OF CHEMICAL ENGINEERING. (Tendentsii razvitiya khimicheskoy tekhniki). Text in Russian. Vestn. Akad. Nauk SSSR, 40(4):22-30, 1971. 9 refs.

The development trends in chemical engineering in the U.S.S.R. are discussed. The enlarged scale of chemical industry, crude oil processing, and related industries brought about the need to build apparatuses of higher production capacity and, at the same time, to build machines for mechanical, hydromechanical, heat-and mass-exchange processes of much larger dimensions. One of the main trends of modern chemical industry is intensification of individual technological processes, e.g., increased rate of flow of gases and liquids in absorption and rectification columns, which requires new constructional designs. Application of new technology (for example, low-temperature plasma) in chemical production calls for development of new equipment. The development of new continuous vacuum driers for paste-like materials will help with the recovery of volatile solvents. A nitric acid production plant is mentioned which uses catalytic disintegration of nitrogen oxides to prevent air pollution. Production tends to be organized in closed cycles to minimize waste.

33863

Miles, F. W.

URBAN NUCLEAR ENERGY CENTER STUDY: ESTIMATES OF PROCESS STEAM CONSUMPTION BY MANUFACTURING INDUSTRIES IN THE UNITED STATES FOR THE YEAR 1980. Oak Ridge National Lab., Tenn., Chemical Technology Div. and Oak Ridge National Lab., Tenn., Reactor Div., Dept. of Housing and Urban Development Contract W-7405-eng-26, 19p., Jan. 1970. 15 refs. NTIS: ORNL-HUD-2

Estimates were made of the consumption of process steam by manufacturing industries in the Unites States for the year 1980 as part of a program for evaluating the usefulness of urban nuclear energy centers. Perazich-type assumptions were made with respect to the use of steam by the selected industries, which included the food operations industry, paper manufacturing, chemicals industry, petroleum refining, rubber and miscellaneous plastic products, and their related fields. Steam consumption in 1962 was estimated by several methods from fuel consumption data in the Census of Manufacturers. The values were projected to 1980 by using energy consumption projections. The estimates of steam consumption varied from 67.6 times 10 to the 14th power Btu to 95.4 times 10 to the 14th power Btu, depending on the methods and assumptions employed. This estimated consumption of steam by manufacturing industries is approximately equal to the 92 times 10 to the 14th power Btu of electrical energy estimated to be required in 1980. Therefore, a significant amount of thermal energy from an urban nuclear energy center would be consumed by manufacturing industries if the area served by the center had a fraction of the country s steam-using industries equal to its fraction of the country s population. (Author abstract modified)

G. EFFECTS-HUMAN HEALTH

05379

INDUSTRIAL AIR POLLUTION CONTROL. Heating, Piping, Air Conditioning 39 (3), 179-94 (Mar. 1967).

This report reflects present thinking and progress in industrial air pollution control, beginning with the problems, especially those stemming from sulfur dioxide, nitrogen oxides, and fly ash emissions and ending with how these problems are faced in various industries today. A comprehensive list of industrial pollutants with corresponding manufacturing sources, typical industries in which they occur, and damaging effects they cause to humans, animals, plants, and property is presented. Control of particulates, equipment selection considerations, and general problems concerning air quality criteria and standards are reviewed. A table depicting particulate emissions before collection from three major sources (utilities, industry, and residential) for the years 1940, 1960, 1980, and 2000 and the amount of emissions from the four types of firing (pulverized coal, stoker coal, cyclone coal, and oil) expressed in millions is included.

11828

D. R. Lamb, R. D. Shriner

PROCEEDINGS OF THE ROCKY MOUNTAIN REGIONAL CONFERENCE ON AIR POLLUTION (NOVEMBER 15-17, 1967.) Wyoming Univ., Laramie, Coll. of Commerce and Industry,110p.,1967. ((140)) refs.

The purpose of the Conference was to bring together representatives of government, industry, and research for a meaningful discussion of air pollution and its causes, effects, and cures. The following topics were discussed: Industrial Gases, Particulates, Industrial Solid Waste Management, The Internal Combustion Engine and Smog, Banquet Session, Air Pollution Effects on Meteorology and Visibility, Air Pollution Effects on Humans, Air Pollution Effects on Animals, Air Pollution Effects Plants, Air Pollution Effects on Materials, Economics of Air Pollution, Air Pollution Control by Feed Lots, Air Pollution Control by Petroleum Plants, Air Pollution Control by Power Plants, Air Pollution Control by Wood Products Plants, and Air Pollution Control by Mineral Processing Plants.

11833

L.L. Braginskaya, V. A. Polyanskii

THE COMBINED EFFECT OF TOXIC SUBSTANCES AND PHYSICAL STRESS ON THE PERFORMANCE CAPACITY AND ENERGY METABOLISM IN THE MUSCLES AND LIVER OF ALBINO MICE. ((O kombinirovannom deistvii toksicheskikh veshchestv i fizicheskoi nagruzki na rabotosposobnost' i energeticheskiye protsessy v myshtsakh i pecheni belykh myshei.)) Text in Russian. Gigiena Truda i Prof. Zabolevaniya, 12(8):46-50, Aug. 1968. 16 refs.

In experiments on male albino mice subjected to physical stress (forced to run in rotating cages, 10 minutes on and 10 minutes off, for 1-3 hours daily), simultaneous exposure to low concentrations of craching (0.07 mg/liter of saturated and unsaturated hydrocarbons plus 0.01 mg/liter of H2S) for 6 hours daily over the course of 9 months resulted in a marked decrease in muscular strength, performance and endurance. Chemical analysis of the muscles and liver revealed an increase in lactic acid and decreases in glycogen, ATP and creatine phosphate as a result of chronic poisoning. These results indicate that further automation of the refining industry is advisable.

19512

Yoshida, K., H. Oshima, and M. Imai

AIR POLLUTION BY SULFUR ACID GAS (I). ON YOKKAICHI TYPE OF AIR POLLUTION. (Aryusangasu niyoru taikiosen (I). Yokkaichi-gata no osen). Text in Japanese. Sangyo Igaku Kenkyusho Gyosekishu (Report Inst. Ind. Med.), no. 3:56-64, June 1, 1969. 18 refs.

Some characteristics of Yokkaichi type of air pollution, which is a distinctive type caused predominantly by sulfur dioxide from petrochemical plants, and three problems in evaluating the air pollution are discussed with regard to respiratory disease. The first problem is whether respiratory disease is influenced more by SO2 average density or peak density. The second problem relates to the lack of discussion about atmospheric SO3, while SO3 constitutes only 3-5% fo the sulfur oxides generated by oil combustion, the H2SO4-mist produced by the absorption of SO3 in atmospheric water is 20 times as noxious as SO2, and has a more severe effect. Finally, the effect of sulfur oxides on respiratory organs varies according to its state, (aerosol, gas, or mist) and to the type of physical reaction with coexisting atmospheric substances. Some findings on the relationship between SO2 pollution and chronic bronchitis in Yokkaichi city are outlined.

19514

Fujino, T., K, Yoshida, K. Miyachi, M. Yoshii, H. Oshima, and M. Imai

STUDY OF MANAGEMENT SYSTEM OF RESPIRATORY DISEASES FROM AIR POLLUTION. (Taikiosen niyoru kokyuki shikkan no kanrihoshiki ni kansuru kenkyu). Text in Japanese. Sangyo Igaku Kenkyusho Gyosekishu (Report Inst. Ind. Med.), no. 3:1-47, June 1, 1969.

The results of a 2-yr medical survey which was conducted to study the relationship between air pollution and respiratory disease in three polluted areas of Yokkaichi City are presented in the form of tables and graphs. The data demonstrate the effect of air pollution on humans, especially with respect to respiratory diseases. The contents are divided into two categories: one concerned with epidemiological aspects of the Yokkaichi type of air pollution, of which the major constituent is sulfur dioxide, and one concerned with clinical hematological studies. Significant findings are that the highest death rate from respiratory disease occurred in the most heavily polluted area of Yokkaichi and that the death rate has tended to increase since the advent of a petrochemical plant. It is concluded that most cases of chronic nonspecific bronchitis are related to bronchus asthma, and that cases of lung emphysema have developed from bronchus asthma rather than chronic bronchitis.

20521

Mamedov, A. M.

THE VITAMIN C AND B1 LEVELS IN THE BODIES OF ADOLESCENTS EXPOSED TO THE ACTION OF HYDROCARBONS. (Sostoyanie C i B1 vitaminnoi obespechennosti organizma podrostkov, podvergayushchikhsya vozdeistviyu uglevodorodov). Hyg. Sanit., 29(3):46-51, March 1964. 15 refs.

Studies were conducted on a group of adolescents undergoing occupational training in an oil-refinery installation to determine the influence of low hydrocarbon concentrations on the vitamin C and B1 levels of the body. Quantitative vitamin analysis was accomplished by testing the urinary excretion on a fasting stomach an hour after the first urination. Thiamin content was determined by the Jansen thiochrome method, and ascorbic acid content was determined by the Jezler-Niederberger method utilizing the Levinson and Ratner modification. Adolescents exposed to hydrocarbons excreted less vitamin C and B1 in urine than a control group; seasonal fluctuations were noted, with excretion of these vitamins lower in spring than in winter. Accumulated data from these studies revealed that the effects of low hydrocarbon concentrations on the vitamin C and B1 levels of the body are reversible. Thus it is possible to reduce the toxic effects of the hydrocarbons by the additon of vitamin supplements to the students' diets. This supplement increases the body's resistance to the unfavorable effects of the hydrocarbons.

21414

Miyachi, Kazuma and Hideo Kashiwagi

AIR POLLUTION AND RESPIRATORY DISEASE OF YAKKAICHI DISTRICT: THE TYPE OF YOKKAICHI ASTHMA. (Yokkaichi chiiki ni okeru taikiosen to kokyuki shikkan: iwayuru Yokkaichizensoku no byokei ni tsuite). Text in Japanese. Sangyo Igaku Kenkyusho Gyosekishu (Report Inst. Ind. Med.), no. 3:69-80, June 1, 1969. 25 refs.

The relationship between the Yokkaichi type of asthma and Yokkaichi air pollution, of which the major constituent is sulfur dioxide from petrochemical plants, are discussed, together with characteristics of the pollution and its effects on respiratory organs. It has been widely accepted that lung emphysema develops primarily from simple chronic bronchitis. This theory is contradicted by a Yokkaichi study which grouped patients with respiratory disease into those (group A) who had the disease before the construction of the petrochemical plants and those (group B) who did not develop it until after the plants were in operation. Group A had a higher incidence of lung emphysema than group B, which tended more toward non specific bronchial asthma. The findings are accounted to the difference in the length of exposure to polluted environment by sulfurous acid gas from the plants, namely, non specific bronchial asthma in group A developed into lung emphysema after more than eight years of exposure. The fact that more bronchial asthma was found in group B underlines the high probability of the group passing through the same process as group A. This type of process is construed to be distinctively representative of the effect of Yokkaichi air pollution. It is concluded that chronic bronchitis is not predominantly responsible for lung emphysema where Yokkachi type air pollution exists.

26053

Yokaichi, Ishikai

STUDIES ON RESPIRATORY TRACT DISEASES CAUSED BY AIR POLLUTION --SURVEY OF PUBLIC NUISANCES GRANT BY THE HEALTH AND WELFARE MINISTRY, IN 1967. (Taiki osen ni yoru kokyuki shikan ni kansuru kenkyu--Showa 42 nendo Koseisyo kogai chosa kenkyu itaku). Text in Japanese. Nippon Ishikai Zasshi (J. Japan. Med. Assoc.), 61(7):805-835, April 1969.

Results of a survey on respiratory tract diseases affected by air pollution in oil combine in Yokkaichi City, Mie Prefecture consisted of the following two points: (1) statistical survey of some obstructive respiratory tract disease by regional group and month (bronchial asthma, chronic bronchitis, pulmonary emphysema, and asthma-like bronchitis) which were diagnosed by members of the Medical Association in Yokkaichi City; and (2) actual conditions of the disease which were recognized as caused by air pollution by medical centers of Yokkaichi City and the Medical Association. Survey included the following seven points, conducted in January, May, and August in 1967: (1) number of medical institutions where the survey was conducted; (2) the survey of chronic obstructive pulmonary diseases; (3) occurrence rate of patients by clinics; (4) distribution of patients by residence; (5) classification of patients by regional groups; (6) age distribution, and (7) ratio of men and women who were older than 55 years of age and younger than 10. Results were described in figures and tables; in this report, data are interpreted but not analyzed. Survey (2) reported the number of patients who were recognized by medical centers of Yokkaichi City Medical Association the number of patients who consulted at medical centers, and the number of patients who underwent physical examination for respiratory tract diseases in a period from June 1967 to March 1968 at the Medical Center of Yokkaichi City. These results were shown in tables classified by residential areas, age, and sex. Analysis is presented of 65 cases of patients who were older than 16 with special reference to chronic obstructive pulmonary disease, a case of Yokkaichi asthma (male, 64 years) is presented.

27920

Mie Prefecture (Japan), Public Nuisance Control Bureau

THE SPECIAL INVESTIGATION REPORT ON AIR POLLUTION IN YOKKAICHI AREA. THE REPORT OF THE SUBCOMMITTEE FOR EPIDEMIOLOGICAL INVESTIGATION. PUBLIC NUISANCE MATERIAL NO. 14. (Yokkaichi chiku taiki osen tokubetsu chosa ekigaku chosa shoiinkai hokokusho). Text in Japanese. 44p., March 1964.

The effects of air pollution in Yokkaichi were investigated and the results were tabulated in diagrammatical and tabular form. Perception of school children concerning air pollution showed that complaints against bad odor were overwhelmingly numerous. Questionnairs presented to the residents in polluted and control areas showed distinct differences in conscious sympotoms. In order to see the effects of air pollution on healthy persons, pulmonary function tests were conducted by means of Wright-peak- flow meter on school children, and peak-flow values were compared for different areas. In the polluted area, the peak-flow values were distinctly lower for boys. In a similar test conducted on the elderly, for both men and women, the values were lower in the polluted area. Other items included the morbidity of the residents, as well as the mortality, and the effects of air pollution on specially designated pollution victim patients. Of the 31 persons whose asthmatic symptoms had become worse, most of the symptoms had started to appear around five years previously, right after the petrochemical complex had moved into the area.

30640

Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan)

CLINICO-PATHOLOGICAL RESEARCH OF RESPIRATORY DISEASES PATIENTS DUE TO AIR POLLUTION. (Taikioseni ni yoru kokyukishikkan no rinsho- byotaigakuteki kenkyu). Text in Japanese. 10p., March 1968.

Examinations were performed on 126 patients of Yokkaichi City, and their clinical picture was observed. The observation was made by dividing the patients into two groups: A group of 27 who became ill before 1959, before the oil complex began operation, and B group of 97 who became ill after 1960. In B group, 64 persons had bronchial asthma, 23 had chronic bronchitis, 10 had emphysema, and six of the 10 who had emphysema also had bronchial asthma. Emphysema is derived from bronchial asthma in Yokkaichi City. Bronchial asthma occurred mainly in those between the ages of 20 and 40 in A group, and in B group, mainly in those over 50. It was observed that pulmonary function in A group patients was worse than that in B group patients. This is probably due to the fact that those in A group had a longer history of illness. The positive rates of CRP were markedly higher in the pulmonary emphysema patients of the A group being 50%, and in the bronchial asthma patients of the B group, being 30%, respectively. The chronic bronchitis patients of groups A and B, and the emphysema patients of group A had a somewhat higher level of the alpha 2 fraction. In all illness types and patterns, 17-OHCS was decreased during seisure. A significant decrease of serum cholinesterase occurred in bronchial asthma patients. In bronchial asthma patients, plasma histamine increased to twice the normal amount when not in seizure, and even more during seizure.

31311

Ueki, Kamezo and Massahi Tanaka

RELATIONSHIP BETWEEN ENVIRONMENETAL POLLLUTION AND DISEASES - AIR POLLUTION IN OTAKE CITY. (Kogai to shippei tono kankei. Otake-s no taikiosen ni tsuite). Text in Japanese. Koshu Eisei Joho (Public Health Inform.), 1(1):23, April 1971.

The air pollution conditions and the pulmonary function values of school children were measured in the Otake district in Hiroshima Prefecture, a petroleum refining area. The subjects were the school children of the Kuba district, where air pollution has not advanced, and those of highly polluted Otake and Ogata districts. The mean of dust fall was 7.35 in Otake and 5.81 in Ogata; the mean of the level of sulfur dioxide was 0.90 in Otake, 0.91 in Ogata, and 0.38 in Kuba. In a previous study, the value obtained by multiplying vital capacity by height was significantly higher in one half of the grades of the schools in the Kuba district than in the other schools. Completely different results were obtained in the present study. To examine the reason for this, the two were compared by Rohrer s and Kaup s indices, which indicate the level of physical substantiality. No difference was observed, suggesting that pulmonary function has no effect on the level of physical substantiality. The correlation coefficient of vital capacity/height with age was 0.657 for males and 0.587 for females in Otake, 0.721 for males and 0.727 for females in Ogata, and 0.698 for males and 0.703 for females in Kuba, showing highly significant correlations. No fixed tendency was observed among the three schools for mean expiratory flow rates. The regression equations of vital capacity in the three schools are shown according to sex.

31664

Yoshizaki, Kazuko

TREND OF COMMUNITY HEALTH OF THE CITIZEN IN PETROLEUM CHEMICAL INDUSTRY CITIES AND ENVIRONMENTAL POLLUTION. PART 1. ECOLOGICAL AND GENERAL STUDY ON THE RELATION BETWEEN THE TREND OF COMMUNITY HEALTH AND LIVING ENVIRONMENT OF THE INHABITANTS IN TOKUYAMA HEALTH CENTER DISTRICT FROM A VIEWPOINT OF MORTALITY BY MAJOR CAUSES. (Sekiyukagakukogyo toshimin no hokendoko to kankyoosen. Dai 1 pen. Shuyoshiinbetsu shiboritsu kara mita Tokuyama hokensho kannai jumin no hokendoko to seikatsu kankyo to no kankei ni tsuiteno seitaigakuteki gaikanteki kosatsu). Text in Japanese. Yamaguchi Sangyo Igaku Nenpo (Ann. Rept. Soc. Yamaguchi Ind. Health), no. 17:48-61, Dec. 1970. 72 refs. The following matters were considered: deaths by major causes of about 220,000 inhabitants in three cities and three towns within the jurisdiction of Tokuyama Health Center during 1958-1965; the relation between death rates for major diseases, soil, and air pollution; and the relation between the growth of school children from six to 17-years-old as of 1965 with local environmental conditions, mainly of soil. Regions studied were divided into petrochemical industrial cities, steel and iron industrial cities, and agricultural-mountainous villages. Major causes of death were divided into two categories, that is, ectogeneous, infectious diseases (tuberculosis, pneumonia, bronchitis, diarrhea, and enteritis) and endogeneous, constitutional diseases (cerebral hemorrhage and cancer). Regional alteration in the death rate for each category was investigated for an earlier period (1958-1961) and a later one (1962-1965). Consequently, regional differences in death rates for both categories did not alter too much annually, and regional accumulation was observed in death rates. A marked degree of regional accumulation was noted in the category of endogeneous, constitutional diseases. Distribution of deaths from endogeneous, constitutional diseases was close connected with soil reactions. Comparison of alteration in regional death rates during the earlier and the later periods indicated decrease in deaths from both disease categories in the petrochemical industrial cities, where air pollution has rapidly decreased since 1964, and in agricultural-mountainous villages, where air has not been polluted. Formerly, both regions had high mortality rates. In the steel and iron industrial cities, where air pollution has increased recently, a yearly alteration different from any other regions was observed for every disease. For example, the death rate by pneumonia increased in Kudamatsu City and Hikari City, and the death rate by bronchitis increased in Kudamatsu City.

31665

Yoshizaki, Kazuko

TREND OF COMMUNITY HEALTH OF THE CITIZEN IN PETROLEUM CHEMICAL INDUSTRY CITIES AND ENVIRONMENTAL POLLUTION. PART 2. ECOLOGICAL STUDY OF THE RELATION BETWEEN THE TREND OF COMMUNITY HEALTH AND LIVING ENVIRONMENT OF INHABITANT TOKUYAMA CITY FROM A VIEWPOINT OF MORTALITY BY MAJOR CAUSES. (Sekiyukagakukogyotoshimin no hokendoko to kankyoosen. Dai 2 hen. Shuyoshiinbestu shiboritsu kara mita Tokuyamasimin no hokendoko to seikatsukankyo tono kankei ni tsuiteno seitaigakuteki kosatsu). Text in Japanese. Yamaguchi Sangyo Igaku Nenpo (Ann. Rept. Soc. Yamaguchi Ind. Health), no. 17:62-78, Dec. 1970. 19 refs.

Death records for 70,000 residents of Tokuyama City were analyzed to determine death rates for two categories of dis-

eases: endogeneous, constitutional diseases (cerebral hemorrhage, cancer, and heart disease) and ectogeneous, infectious diseases (pneumonia and bronchitis). Further, the death rate for each category was compared with national death rates for the periods 1958-1969 and 1962-1965. The relationship between death rates and quality of soil, water, and air was considered. In Tokuyama City and throughout Japan, deaths attributable to ectogeneous, infectious diseases are declining while those due to endogenous, constitutional diseases are increasing. The tendency is especially noticeable in Tokuyama City. In all years, decrease in air pollution was associated with decreased mortality from pneumonia and bronchitis in two sensitive groups: infants and children up to four years of age and adults over 40 years. With respect to their influence on death rates, dust fall and sulfur dioxide are in direct proportion to each other.

34194

Miyaji, K., S. Yamazaki, H. Kashiwagi, S. Takahashi, and A. Watanabe

ASTHMATIC DISEASES IN YOKKAICHI AREA - CLINICAL STUDIES. (Yokkaichi chiku ni okeru zensokuyo shikkan - rinshozo o chushin to shite). Text in Japanese. Naika, 21(5):850-858, May 1968. 6 refs.

Air quality measurements correlated with respiratory diseases were studied for the Yokkaichi area. Atmospheric concentrations of sulfur dioxide, sulfur trioxide, hydrogen sulfide, mercaptans, hydrocarbons, and settling particulates increased. The SO2 content fluctuated sporadically and drastically between zero and high peaks of 0.5-1.0 ppm. Based on reports of government health insurance cases, the values for pharyngitis and bronchial asthma increased annually since April 1961, with twice as many cases in the polluted areas as in the non-polluted areas. Bronchial asthma cases were especially prevalent among patients under five and over 50 years old. Influenza and bronchitis increased in the polluted areas, and cases of lung cancer rose suddenly between April 1964 and March 1965. The number of chronic bronchitis cases increased from 1.63% in 1959 to 8.0% in 1967, correlated with an oil industry complex which started operation in 1962; bronchial asthma cases increased from 3.14% in 1962 to 7.4% in 1967. Most of the cases attending the clinic after 1962 were ambulatory, but 60% of all the cases were bronchial asthma patients.

H. EFFECTS-PLANTS AND LIVESTOCK

01640

M. Katz

SOME ASPECTS OF THE PHYSICAL AND CHEMICAL NATURE OF AIR POLLUTION. World Health Organization Monograph Ser. (Air Pollution). No. 46 1961. pp. 97-158.

This chapter of the WHO Monograph reviews works on air pollution accomplished within the last ten to 15 years. The subject of the physical and chemical nature of air pollution is so broad and covers many fields of physics, chemistry and medicine that only the most important works have been highlighted. Discussed among others were the following problems: The development of improved methods and techniques for the measurement, separation and identification of air contaminants, the standardization of methods of sampling and analysis of common air pollutants, the application of meteorological concepts and diffusion theory to the study of the dispersion of pollutants in the atmosphere, the formation of smog and the prediction of pollution levels, the development of improved analytical techniques, instrumentation and studies of motor vehicle exhaust gas composition under various operating conditions and the development of catalytic and other exhaust gas system control devices, the study of the action of sunlight on motor vehicle and traffic gas and of photochemical atmospheric reaction in general, the determination of the health and other effects of irradiated gaseous and vapour pollutants, the continued study of carcinogenic and other toxic substances presented in the urban environment and the evaluation of their effects on health, and the study of radioactive pollutants and their effects in connection with the development of industrial uses of nuclear energy for power and transportation.

01930

E. Brennan, I. A. Leone, and R. H. Daines

INVESTIGATION OF SO2 EFFECTS ON RUBBER TREES AS A MEANS OF FORESTALLING INJURY TO MALAYAN PLANTATIONS FROM REFINERY EMISSIONS. J. Air Pollution Control Assoc. 14, (6) 229-33, June 1966.

A study of the effects of SO2 concentrations on rubber trees, subjected to short- and long-term fumigations at increasing SO2 concentrations in a test fumigation chamber was made. Results of the tests led to the following conclusions: Four-hour fumigations of dry rubber trees under conditions simulating the climate of Malaya did not produce injury until the concentration of 0.78 SO2 ppm was reached. Fifteen-minute exposures of the trees failed to cause injury until the concentration of 75 to 100 ppm SO2 was reached. When rubber plants having wet leaves were fumigated for a four-hour period, slight injury was produced at 0.40 ppm SO2. Total sulfur determinations of composite dry leaves showed no significant increase over that in untreated checks until the concentration of 0.70 ppm SO2 was reached. Trees which were fumigated wet showed a significant increase in total sulfur content over dry check trees even at the lowest SO2 concentration of 0.13 ppm. Old leaves consistently had a higher total sulfur content than did younger leaves. In young leaves a considerable part of the absorbed sulfur (up to 30%) could be washed off the surface, whereas old leaves or composite samples failed to show any decrease in sulfur content on washing. This might be used as a criterion for exposure of foliage to atmospheric SO2. A total sulfur content of the foliage sufficient to cause injury when accumulated at a rapid rate failed to injure when accumulated over a three week period. Respiration studies failed to indicate the possibility of hidden injury occurring during this prolonged fumigation. Rubber trees respond similarly to other woody species to the presence of SO2, being injured at much higher concentrations than were most of the herbaceous species tested.

06967

PREVENTION OF AIR POLLUTION IN THE STATE OF NORTH RHINE- WESTPHALIA. Ministry of Labour and Social Welfare, North Rhine-Westphalia, Germany)). (Report to the Congrss on the 'Prevention of Air Pollution', Duesseldorf, Germany, Apr. 5-7, 1965.) 78p. Translated from German.

A survey of the activities in North Rhine-Westphalia for the prevention of air pollution is reported and the results are summarized. The report included: (I) history, legal basis, administrative organization, smogwarning network, and economic problems; (II) Report of the Factory Inspection Dept. (Enterprises subject to approval and other enterprises and working places); and (III) report of the State Institute for Air Pollution Control and Land Utilization (monitoring of air pollution, techniques for measuring immissions, relationship between emission and immission, technical steps for the restriction of emissions, and the effect of air pollution on soil, vegetation and animals.

22491

Kucherov, E. V. and B. E. Fedorako

EFFECT OF INDUSTRIAL POLLUTANTS ON THE VEGETATION OF BASHKIR A.S.S.R. In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Effects and Symptoms of Air Pollutes on Vegetation; Resistance and Susceptibility of Different Plant Species in Various Habitats, In Relation to Plant Utilization for Shelter Belts and as Biological Indicators. M. Y. Nuttonson (ed.), vol. 2, Silver Spring, Md., American Institute of Crop Ecology, 1969, p. 19-23. (Also: Akad. Nauk SSSR Ural. Filial. Ural. Gos. Univ. im A. M. Gor'kogo Okhrana prirody na Urale. (Sverdlovsk), 4:163-168, 1964.)

Most plants, particularly conifers, are very sensitive to gas pollution which causes arrested growth and changes in the color of leaves and foliage. At small gas concentrations, the edges of leaves curl and foliage yellows, while at higher concentrations burns appear; leaves turn brown and wilt. This causes premature, partial, and complete defoliation. In 1950, various species of trees and shrubs were planted on the grounds of a Russian refinery. Red ash showed a high gas resistance; although its leaves curl, it gives an annual height increment. The leaves of little leaf linden yellow and curl, and those of the European white birch yellow prematurely. Balsam poplar leaves yellow, turn brown, and drop prematurely. Under conditions of prolonged gas pollution of low concentra-

tion, all deciduous trees are more resistant than conifers. It is recommended that protective plantings be established near industrial enterprises, in open areas between them, and directly on their grounds. These plantings should consist of thick, multi-stage trees and shrubs, such as poplar, linden, apple, hedgerow rose, Siberian pea shrub, Tartar honeysuckle, raspberry, and black currant. Such plantings will change the gas composition of the air for the better.

22585

Kulagin, Yu. Z.

SMOKE RESISTANCE OF WOODY PLANTS AS AN ECOLOGICAL PROBLEM. In: American Institute of Crop Ecology Survey of USSR Air Pollution Literature. Effects and Symptoms of Air Pollutes on Vegetation; Resistance and Susceptibility of Different Plant Species in Various Habitats, In Relation to Plant Utilization for Shelter Belts and as Biological Indicators. M. Y. Nuttonson (ed.), vol. 2, Silver Spring, Md., American Institute of Crop Ecology, 1969, p. 32-34. 2 refs. (Also: Akad. Nauk SSSR. Ural. Filial. Komis. po Okhrane Prirody. Rastitel' nost' i promyshlennye zagryazneniya. Okhrana prirody na Urale. V (Sverdlovsk, 1966), p. 25-27.)

The ecological factor of smoke resistance in woody plants was the basis of investigations in areas surrounding metallurgical and petroleum refineries. Conditions of smoke pollution should be distinguished by considering the physico-chemical properties of the toxic components of the smoke, the intensity of gas and dust effects, the frequency of their occurrence during the growing period, and their annual recurrence. This ecological concept requires a recognition of the critical periods when the sensitivity to toxic components is greatest. The critical periods are connected with weak morphological defense of tender shoots; inability to regenerate leaves; and injury followed by unfavorable weather conditions. The critical period for conifers dusted with magnesium oxide is early summer, when the needles are being formed. A sulfur dioxide attack in early or midsummer is lethal for pine, spruce, lilac, and other species with a weak leaf regeneration capacity. A late summer exposure to SO2 is not injurious. Smoke from industrial plants should be considered as an ecological factor The degree of toxicity of industrial gases depends greatly on the surrounding atmospheric conditions. The survival and regeneration of tree is determined by the maturity of the shoots and their resistance to the subsequent weather conditions.

23257

Skye, Erik and Ingemar Hallberg

CHANGES IN THE LICHEN FLORA FOLLOWING AIR POLLUTION. Oikos, 20(2):547-552, 1969. 8 refs.

Lichen flora on tree trunks around a shale oil works were analyzed with regard to composition and distribution in 1951/1953 and in 1967/1969. Changes in lichen distribution were observed and attributed to increased levels of atmospheric sulfur dioxide that persisted until production at the shale oil works was terminated in 1966. Between 1953 and 1967, lichen species normally connected with acid barks increased markedly. Their appearance on trees that normally have only moderately acid bark indicates that the substrate is obviously being acidified within the investigation area. Bark originally of relatively high pH needs a longer time or more intensive exposure to acid chemicals to reach a pH level within the tolerance of lichens normally found on acid bark. Probably direct poisoning of the lichens also plays a part in these changes. By the summer of 1967, some signs of recovery were observed in certain lichen species, in particular strong lobe growth in lichen thallus.

23583

Scholl, G.

A CONTRIBUTION TO THE RECOGNITION PROBLEM OF PLANT DAMAGE INDUCED BY IMMISSIONS. (Ein Beitrag zum Problem der Erkennung von immissionsbedingten Pfanzenschadigungen). Schriftenreihe Landesanstalt Immissions- und Bodennutzungsschutz Lands Nordrhein- Westfalen (Essen), 1969:73-79. Translated from German. Belov and Associates, Denver, Colo., 15p., July 1, 1970.

Turnips, barley, and trees growing on farms bordering a fertilizer manufacturing plant and a refinery exhibited disturbed growth, partial defoliation, and leaf discoloration. When sulfur dioxide emissions in the area were determined to be of a magnitude sufficient to cause plant damage, the question of emission effect on the fertility of soil was clarified in corresponding soil investigations. Soil analyses revealed a 30-50% decrease in 'root soluble' nutrients, significantly lower pH values, and a decreased base activity that correlated with an abnormally high sulfate content in the soil as well as in spring water and rivers. These results show that the acidifying action of sulfur dioxide can have an adverse influence on the alkaline balance of light soil.

30637

Chiba Prefecture (Japan)

AIR POLLUTION AND PLANT DAMAGE WITH SPECIAL REFERENCE TO THE DAMAGES OF PEAR TREES IN ICHIHARA DISTRICT, CHIBA PREFECTURE. (Taikiosen to shokubutsu higai -Chiba-ken Ichihara chiku no nashi no higai o chushin toshite). Text in Japanese. 158p., March 1968.

The causes of plant damage between 1965 and 1966 in Ichihara City, Chiba Prefecture were investigated and countermeasures were examined. Damage was seen in pear orchards, street trees, and shrubs located near an oil-refinery, petroleum chemical factories, and a steam-power plant, which mainly use heavy oil. Damage to peaches was frequent at the time of flowering and expansive growth, when the resistance to sulfur dioxide was greatest. The time that the damage occurred agreed with the time when the concentration of SO2 was high. Therefore, damage was mainly due to SO2. Damage to pear trees sprayed with the coal Bordeaux mixture was also observed. However, damage by agricultural chemicals had never been seen, so the relationship between such phenomena was investigated. Decidious broad-leaved trees are easily affected, and evergreen broad-leaved trees are relatively resistant. A correlation was observed between the damage and the direction of flying contaminated substances. The damage was heavy in the cases of a north wind, rainy weather, smog, stagnant air current, and successive fine weather. The relationship between damage and these elements was investigated. The occurrence of damage in 1965 and 1966, possible causes, countermeasures, and results were discussed.

I. EFFECTS-MATERIALS

07553

Yocom, John E.

THE DETERIORATION OF MATERIALS IN POLLUTED ATMOSPHERES. J. Air Pollution Control Assoc., 8(3):203-208, Nov. 1958. 34 refs. (Presented at the 14th Annual Conference and 1958 Exhibition, National Assoc. of Corrosion Engineers, San Francisco, Calif., March 20, 1958.)

A group of spcific air pollutants known to produce deterioration of materials, the principal sources of these pollutants, and the most likely mechanisms by which deterioration of a variety of materials can occur are discussed. Specifically, the pollutants are carbon dioxide, sulfur dioxide, sulfur trioxide, hydrogen sulfide, hydrogen fluoride, ozone and solid particulates.

20820

COMMUNITY AIR QUALITY GUIDES: SULFUR COMPOUNDS. Am. Ind. Hyg. Assoc. J., 31(2):253-260, March-April 1970. 26 refs.

The major sulfur compounds detected in the atmosphere are sulfur dioxide, sulfur trioxide, sulfuric acid, sulfates, and hydrogen sulfide. The chief effects of SO2 are eye and respiratory tract irritation, and increased pulmonary resistance. At concentrations of 87 mg/cu m for 2.75 hours, SO3 proved fatal to guinea pigs. Hydrogen sulfide is a respiratory and eye irritant at low concentrations, and at high concentrations can cause respiratory paralysis. It is believed that sulfur compounds produce a more severe effect when they are adsorbed on a particle small enough to penetrate the lung. Sulfur oxides and hydrogen sulfide can also damage vegetation. Materials such as metals, paper, leather, textiles, paint, and ceramics are also damaged by sulfur compounds. It is suggested that the sulfur oxide concentration in the air kept as low as possible to prevent damage to vegetation, deterioration of materials, and to avoid the presumed adverse health effects. Methods for sampling sulfur compounds and their physical and chemical properties are also included.

33597

Naruse, Gen

EROSION SPLIT OF STEAM STRIPPER OH LINE. (Steam Stripper OH line no fushoku ware ni tsuite). Text in Japanese. Preprint, Japan Petroleum Institute, Tokyo, p. 75-77, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 10b.)

Cracks discovered on the UOP Isomax at an oil refinery one week initial operation were investigated. Three cracks on bead of welded connections and one on an elbow of the stream stripper overhead line were determined. Operating conditions of temperature, pressure, material construction, liquid composition, flow speed, and volume of hydrogen sulfide was examined. The elbow was not heat-treated by the manufacturer. Microscopic sulfur print tests of the cracks revealed sulfur particles. A high concentration of hydrogen sulfide, high residual stress such as vibration due to an earthquake, and imperfect welding were determined as the causes of the damage. The carbon steel was repaired and since then the corrosion rate has been extremely low (0.35 mm/year).

33598

Irie, Masao

EROSION OF HIGH PRESSURE SEPARATOR EMERGENCY PRESSURE CONTROL VALVE. (Koatsu separeeta kinkyuyo atsuryoku kontororu barubu no fushoku). Text in Japanese. Preprint, Japan Petroleum Institute, Tokyo, p. 79, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22,23, 1971, Paper 10c.)

Corrosion in a high pressure separator of an oil refinery was investigated. An emergency pressure control valve damaged three month after start of operations. Localized damage 0.2 mm deep was determined on the plug, the curved line under the seat, and the seat ring. The entrance and exit pressures wore 91 and 0 kg/sq cm, and the temperature was 60 C. Severe and drastic damage was caused by the slight leakage of corrosive gas between the plug and the seat ring, intensified by the angular shape of the valve, and due to its usually closed state. Severe corrosion due to sulfur dioxide was determined in the reducer around the pressure control valve in the low-pressure seperator. Corrosion treatment included careful selection of material and anti-corrosion treatments when designing the apparatus.

33599

Niwa, Kiyoshi

HEAVY OIL DESULFURIZATION PLANT REACTION TOWER EFFLUENT AIR COOLER. (Juyu datsuryu puranto hannoto efuruento kuki reikyakuki no fushoku to mondaiten). Text in Japanese. Preprint, Japan Petroleum Institute, Tokyo, p. 61-63, 1971. (Presented at the Seminar Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 9c.)

Corrosion of carbon steel effluent condenser pipes of reactor in the desulfurization system of an oil refinery was investigated. Maximum corrosion of 0.7-0.9 mm/month was determined on condenser u-bend tubes. Straight pipes showed normal wear, with some localized corrosion as high as 2.8 mm/year. When the u-bends were replaced by T-shape bends, corrosion of 0.5-0.7 mm/month still occurred. Almost all corrosion occurred in the bends of lower tubes (condensed area), but the locations of eroded tubes in relation to the tube bundles were irregular, and the ratio of corroded tubes to the total number of tubes was small. A high speed flow (more than 20 ft/sec) was determined as the cause of corrosion, affected by flow irregularity. Change of flow direction at the bend and solution of welding bead caused localized corrosion. An inhibitor was effective in reducing corrosion to 0-0.2 mm/month. Corrosion treatment and reduction included decreasing flow speed, even flow distribution, pipes made of high corrosion-resistant material ferrite-type steel, and monitoring of chlorine content.

33600

Naito, Masayuki, Tetsunosuke Hashimoto, and Tatehiko Kihara

STRESS CORROSION CRACKS OF SOFT STEEL OF GAS REFINING APPARATUS. (Gasu seisei-soshi (dattansan) ni okeru nanko no oryoku fushoku ware). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 47-51, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 8.)

Stress corrosion cracks which developed on soft steel instruments of the decarburization system of gas refining apparatus were investigated. The process consisted of arsenic oxidized material added to the refining solution and heat-activated potassium carbonate. Cracks by transgranular corrosion appeared on the regenerator, solution heat exchanger, and the surrounding pipe system. Tests performed to reconstruct similar cracks caused by residual stress confirmed the corrosion and the effectiveness of stress elimination heat treatments. Pitting seemed to contribute to the appearance of cracks, which were deterred by contact with different metals.

33602

Ikkai, Shunkei, Yasuo Ishimaru, and Kenichi Takanashi

HEATING-TIME RELATIONSHIP IN PADDING AND WELDING PART TRANSFORMATION. (Nikumori yosetsubu no aknetsu jiko henka). Tex in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 43-46, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 7.)

The influence of time and temperature on the decarburized layer of foreign material in a desulfurization plant reactor was examined. In order to eliminate stress, decarburization and cementation occur in the padded welding section after the heat treatment. The welded part further deteriorates under the influence of extended heating and in the environment of sulfuric material ultimately developing cracks. Decarburization and cementation decreased in proportion to the amount of chromium in the molybdenum steel. Stretch, shock, and bend were tested. Stress concentration was 1.6. The reduction of absorbent energy with the increase of heat treatment was extreme. Stretch in relation to heating time was determined. The bending test determined micro-cracks in the side-bend for heat treatments of 650 C for more than 10 hours.

33611

Iida, Wataru

PROBLEMS IN REACTION TOWER EFFLUENT AIR COOLER. (Hannoto efurento kuki reikyakuki no mondaiten). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 55-57, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 9a.)

Corrosion of heavy oil desulfurization apparatus in an oil refinery was investigated. Leakage on the pipe system of the reactor condenser, corrosion at the welded sections of tubes, and the principles of the flow process are examined. Corrosion, localized inside the elbow, occurred without scale forming. The constant exposure to highly concentrated hydrogen sulfide and ammonia solution was determined as the cause. The damages due to corrosion were treated by slowing down the flow rate, using corrosion-resistant ferrules, applying anticorrosion resin lining, and covering vulnerable materials with stainless steel.

33612

Mizuno, Kazuhiko, Tatsuo Iwamizu, and Hiroji Takeuchi

PROBLEMS IN WET H2S CLASS MACHINES AND PIPE INSTALLATION. (Shitsu-H2S kei kiki, haikan no mondaiten). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 71-73, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 10a.)

Corrosion of the heat converter, cooler, and separators of the desulfurization apparatus of an oil refinery was investigated. Localized corrosion, as deep as 9.0 m/m, on the valve near the exit nozzle and the shell of the effluent after-cooler was related with a whirlpool of liquid in the vicinity. Corrosion on the surface of the separator overhead condenser tube occurred as a hole caused by metal loss in the direction of the flow. Similar corrosion was determined in the separator. The damages were correlated with the stopping of the liquid flow. The corrosion inhibitor failed to form a coating inside the tubes.

33643

Iida, Wataru

SPLIT IN REACTOR ENTRANCE ELBOW FOREIGN MATERIAL WELDING. (Hannoto iriguchi erubo izai yosetsubu no ware). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 103-105, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo Japan, March 22-23, 1971, Paper 12b.)

Cracks discovered on the reactor entrance elbow after eight months operation of desulfurization equipment were investigated. The thickness and construction were examined for differences between the welded part and the reactor material. Corrosion due to hydrogen sulfide solution and stress caused locally by the elbow shape and welding residue were determined. Heat-resistant coating was applied as temporary treatment. The entire elbow was later reconstructed of chromium-molybdenum (2 1/4-1) and welded with the same material.

33651

Irie, Masao

CORROSION AND TREATMENT OF DECOMPRESSION LIGHT OIL DESULFURIZING SYSTEM. (Genatsu keiyu datsuryu sochi no fushoku to taisaku). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 59-60, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 9b.)

Corrosion of tubes and pipes in the apparatus of an oil refinery was investigated. The conditions under which hydrogen sulfide corrosion occurred are examined with respect to desulfurized solution, temperature, pressure, and hydrogen and hydrogen sulfide content.

33674

Iwanaga, Tatsuo, Kazuhiko Mizuno, and Hiroji Takeuchi

PROBLEMS OF CORROSION IN HYDROGEN MANUFACTURING SYSTEM. (Suiso seizo sochi no fushoku ni yoru mondaiten). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 115-119, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 13b.)

Corrosion in the hydrogen manufacturing system of an oil refinery was investigated. Pressure differences on valves were determined as the cause of leakage. The difference of pressures at the globe valve was 20 kg/sq cm. An additional valve

was added and the pressure was distributed. The size and type of a control valve was changed. Anti-corrosive additive used in the system was effective where the corrosion rate was less than 0.2 mm/year. The corrosion resistant coating could not form where flush occurred due to pressure change. Corrosion of parts of the pipe system and on a stainless steel heat exchanger was due to carbon dioxide.

35034

Kitahama, Kunio

EROSION OF DESULFURIZING SYSTEM H2S STRIPPER CONDENSER TUBE. (Datsuryu sochi H2S Stripper condenser tube no fushoku). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 85-87, 1971. (Presented at the Seminar Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971.)

A condenser tube of the hydrogen sulfide stripper of Mono ethanol amine scrubber at the Mizushima Refinery was damaged by corrosion. But, in this case, the corrosion was not caused by H2S. Fuel gas and MEA hydrogen sulfide absorbent are sent to the H2S stripper. The vapor is cooled and the H2S is separated in the overhead accumulator. The duplex tube s outer diameter is 19 mm, the material for the outer layer is STB 30, 1.25 t, the inner layer is BSTF 2, 1.25 t. A cross section of the tube showed that the inner BSTF 2 was locally corroded by seawater around the H2S gas inlet nozzle, and the outer material STB 30 was exposed to seawater and the STB layer received galvanic corrosion. The corrosion had evidently started from the inside in the grain boundery because of localized high temperature in the tube. For treatment, the outer layer was replaced with SUS 28 which has a high H2S resistance rate and the inner layer was exchanged with CNTF 1 for its resistance against seawater and against hot spot corrosion.

J. EFFECTS-ECONOMIC

01546

J.J. Hanks H.D. Kube

INDUSTRY ACTION TO COMBAT POLLUTION. Harvard Bus. Rev., 44(5):49-62, Oct. 1966.

The responsibilities of individual corporations in air pollution abatement are emphasized. Sources of pollution discussed include the paper, steel, electric power, transportation and petroleum industries. Principal equipment for removal of aerosols and particulates is described. It is concluded that although air pollution equipment increases costs in certain industries, recovery of pollutant, such as fly ash, may help to offset the costs. Government activities in air pollution programs are summarized.

09313

THE RISING COSTS. Mach. Des., 39(17):23-24, July 20, 1967.

Damage from air pollution both direct and indirect has been estimated at 65 dollars per person per year, or 11 billion dollars annually. Agricultural losses are estimated at 325 million dollars annually. A single day of smog in California a few years ago reportedly ruined an entire lettuce crop. On the eastern seaboard, pollution is said to destroy 18 million dollars of crops each year. Atmospheric corrosion from sulfuric-acid mist has been reported to do about 6 million dollars damage per year in New York City alone. The costs of control, although a small per- centate of the 11 billion dollars total, are also significant. The petroleum industry is reported to spend 18 million dollars annually on air pollution control out of a total capital outlay of 350 million dollars. The major steel manufacturers in the Chicago area entered into a 8-yr agreement with the local re- gulatory agency to prevent some 88,000 tons of dust annually from entering the atmosphere. The estimated total cost of the program is 50 million dollars. Research efforts into better detection and control seem pitifully small in comparison to the total damage estimate. Federal Government research allocations will approach 18 million dollars in 1968. The anticipated expenditures at the Federal level to achieve goals in reduction of pollutant levels and in establishing air quality criteria are estimated at 130 million dollars over the next several years.

20536

McClanahan, Roger B.

MORE MONEY FOR POLLUTION CONTROL. Conf. Board Record, 5(9):26-29, Sept. 1968. 3 refs.

Two-hundred and one companies in 16 industries were surveyed and found to have increased their capital expenditures for pollution control from $397 million in 1967 to $547 million in 1968. In addition, the companies will s, end over $31 million for antipollution research and engineering in 1968 as against $30 million in 1967. Textile mills reported the largest increase (up to 400%) in control expenditures. Rises exceeding 250% are indicated for wood products, scientific and controlling instruments, and electrical machinery. Producers of fabricated metal products, rubber, and plastics are more than doubling their outlays. Only aircraft and parts and food products show decreased expenditure. Almost two-thirds of the total 1968 budget is allocated to water pollution. Industries that have earmarked considerably more for water pollution include fabricated metals, scientific and controlling equipment, food products, and nonelectrical machinery. For firms engaged in primary iron and steel, chemicals, and petroleum refining, expenditures are more evenly divided between air and water control. Companies making stone, clay, and glass products, electrical machinery, and aircraft and parts will devote the major part of their abatement expenses to air pollution.

21241

Fogel, M. E., D. R. Johnston, R. L. Collins, D. A. LeSourd, R. W. Gerstle, and E. L. Hill

COMPREHENSIVE ECONOMIC COST STUDY OF AIR POLLUTION CONTROL COSTS FOR SELECTED INDUSTRIES AND SELECTED REGIONS. (FINAL REPORT). Research Triangle Inst., Durham, N. C., Operations Research and Economics Div., NAPCA Contract CPA 22-69-79, RTI Proj. OU-455, 414p., Feb. 1970. 360 refs. CFSTI: PB 191054

Costs are estimated for controlling emissions of particulates, sulfur oxides, hydrocarbons, and carbon monoxides from twenty-two sources within 100 metropolitan areas, through the Fiscal period 1970-1975; data defining relevant processes and air pollution control engineering characteristics required to support the analyses are presented. Sources for which control cost estimates were made are solid waste disposal, steam-electric generating plants, industrial boilers, commercial and institutional heating plants, residential heating plants, and the following industrial categories: kraft pulp, iron and steel, gray iron foundry, primary and secondary nonferrous metallurgy, sulfuric acid, phosphate fertilizer, petroleum refining, cement, lime, coal cleaning, petroleum products and storage, grain milling and handling, varnish, and rubber tires. The total investment cost includes $221 million, $1.29 billion, and $1.13 billion to control emissions from solid waste disposal, stationary combustion, and industrial process sources, respectively, while the metropolitan areas for which cost estimates are the highest include the very large, highly industrialized, more northern cities of Chicago, New York, Pittsburgh, Philadelphia, Cleveland, Detroit, and St. Louis. Assuming the 1967 emissions as a baseline, calculations are performed to determine the pollutant removal efficiencies required to bring the emissions into compliance with the standards assumed. (Author abstract modified)

24309

Mammarella, Luigi

26326

Japan Industrial Machine Engineering Assoc.

ACTUAL PRODUCTION OF INSTRUMENTS PREVENTING INDUSTRIAL PUBLIC NUISANCE IN 1969. (Showa 44 nendo sangyo kogai boshi sochi seisa jisseki). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 6(11):916-917, Nov. 1970.

Based on answers received from 98 out of 110 companies surveyed, a table is compiled of the amount invested by industry and government in 1969 in each of six categories of air pollution control equipment. The categories are dust collectors, heavy oil desulfurization equipment, exhaust gas desulfurizers, other exhaust gas purifying devices, high stacks (above 70 m), and connection instruments (?). Statistics are also presented for export sales in each category. The following types of industries are represented: food, pottery, paper-pulp, petroleum refining, chemical and petro-chemical, synthetic fiber, non-iron refineries, sulfuric acid, fertilizer, electric power, and construction.

27506

Graef, A. F., L. E. Gressingh, and F. E. Miller

THE DEVELOPMENT OF NEW AND/OR IMPROVED AQUEOUS PROCESSES FOR REMOVING SO2 FROM FLUE GASES, FINAL REPORT, VOL II. Aerojet- General Corp., El Monte, Calif., Air Pollution Control Dept., Contract PH 86-68-77, 173p., Oct. 1970. NTIS: PB 196781

Results are presented of laboratory studies on the ability of zinc oxide and magnesium oxide to remove sulfur dioxide from gas streams in fluidized bed systems. Special attention is given to the conditions required for minimizing the oxidation of SO2, preventing the formation of sulfate, and effecting the decomposition of zinc sulfite and magnesium sulfite. Also discussed are inhibitors and complexing agents for preventing inadvertent sorbent oxidation. Capital and operating costs are presented for an optimized fluidized zinc oxide process as applied to a new 1400 MW power plant installation. Capital costs are estimated for a magnesium-base slurry scrubbing system for a 1400 MW plant.

30329

CONFERENCE ON THE PUBLIC ACTION AGAINST POLLUTION. (Convegno sul tema L intervento pubblico control l inquinamento). Text in Italian. Riv. Combust., 24(10):453-454, Oct. 1970.

A brief summary is given of a meeting held June 18-19, 1970 in Rome, sponsored by two corporations, on the responsibility of the public in pollution control. A 175-page report was presented to the public, and the meeting was thrown open to discussion. The thrust of the presentation indicated that the two corporations expect the public to shoulder most of the financial burden for pollution control, since it is the public which primarily benefits from the preservation of the environment. Estimates of the cost of eliminating the principle forms of air and water pollution in Italy called for an investment cost of 609 billion lire (about one billion dollars) in 1970, decreasing to 243.7 billion lire (389 million dollars) in 1980. The operating and maintenance costs are 47.6 billion lire (76 million dollars) for 1970, increasing to a projected 714.3 billion lire ($1,143,000,000) or 888.8 billion lire ($1,422,000,000) by 1985, according to two differing estimates. One criticism of these figures is that they assume the immediate implementation of certain measures that the industries involved do not consider feasible at present. For instance, the plan calls for the use of catalytic afterburners and lead-free gasoline in the automotive and petroleum industries, both of which consider these improvements unattainable at the moment. The study assumes an investment for catalytic exhaust manifolds and the additional annual cost of lead-free gasoline. Investment costs are also given for the metallurgical industries, nonmetallurgical industries related to mining, chemical industries, thermoelectric plants, and domestic heating. The figures for domestic heating assume that the heating plants are already adequately equipped with pollution controls in accordance with the Italian anti-smog law (No. 615).

30951

Japan Development Bank

TREND IN INVESTMENT ON PUBLIC NUISANCE CONTROL FACILITIES. (Kogai kankei setsubi toshi no doko). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(5):261-262, May 1971.

Questionnaires were sent to 893 industries with a working capital of more than $280,000 concerning their spending plans for 1970 and 1971 for installation of pollution control facilities. The 844 which replied comprised 94.5%. The total spending plan for 1970 was $479,640,000, a 58% increase from 1969 and $767,480,000 for 1971, a 60% increase. A classification breakdown shows that the steel, electric, chemical, petroleum refining, non-steel metals, and paper-pulp industries share 80% of the total spending for both 1970 and 1971. For production of anti- pollution products (improvement of products), $30,240,000 was spent in 1970 and $64,120,000 in 1971 of which the major portion was shared by automobile manufacturers and petroleum refining companies. The ratio of spending for pollution control in relation to working capital for 1971 is 6.3% as compared to 4.7% in 1970 and 4.6% in 1969. Industries with high-ratio investments for pollution control devices in 1971 are petroleumm refining (15%), paper-pulp (11%), non-steel metal (10%), steel (7%), and chemical (7%). The breakdown of spending by classification of pollution types (except for spending for improvement of products) for both 1970 and 1971 is air pollution, 65-66%; water, 27-28%; and others, 7-8%. A geographical breakdown shows that the Tokyo-Yokohama-Chiba coastal area shares 23% of the total spending for 1971; the Nagoya-Yokkaichi-Hamamatsu coastal area, 18%; and the Osaka-Kobe area, 19%. Thus, the three major industrial areas of Japan share 60% of the total industrial anti-pollution spending of Japan (58% in 1970).

31814

Anderson, H. S., R. E. Paddock, R. O. Lyday, M. E. Fogel, E. L. Hill, and F. A. Ayer

USER S MANUAL AUTOMATED PROCEDURES FOR ESTIMATING CONTROL COSTS AND EMISSION REDUCTIONS FOR SPECIFIED AIR POLLUTION SOURCES. (FINAL REPORT). Research Triangle Inst., Research Triangle Park, N. C., Operations Research and Economics Div., APCO Contract CPA 70-60, RTI Proj. OU-534, Rept. FR-OU-534, APTD-0665, 352p., Dec. 1970. NTIS: PB 198779

A user s manual is presented enabling other researchers to use and modify the computer programs developed within this research project for estimating the costs and emissions of specified industrial air pollution sources. The output from each source program consists of emission estimates, both before and after control, as well as required control costs on a plant by plant basis. The manual describes the input requirements, operational characteristics, and output characteristics for each program. A master report generating program was also developed. This program uses as input the output from one, all, or any combination of source programs; it generates summary data in the form of a single industry or multiple industry, and sums within a range of desired geographical areas. The area may be a single or combinations of Air Quality Control Regions or states. Again, the manual describes the input requirements, operational characteristics, and output characteristics of the report generating program so that the user has maximum flexibility in the use of the present system and, in addition, has the ability to redesign the system to his specific needs. Computer programs are presented for petroleum refining, phosphate fertilizer, kraft pulping, foundry operations, sulfuric acid, primary nonferrous metallurgy, steam-electric power plants, and other industries. (Author abstract modified)

33642

Utsu, Motoo

PROBLEMS IN SECURITY OF EFFLUENT HEAT EXCHANGER. (Efuruento netsuko no hozenjo no mondaiten). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 107-109, 1971. (Presented at the Seminar on Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971, Paper 12c.)

Over-size refinery apparatus, especially heavy oil desulfurization equipemnt, is reviewed for cost of maintenance, operation, and protection from corrosion. An overhaul of a heat exchanger can cost as much as $8000. The operation of overhauling consumes many man-hours, due to the bolt sizes. The unit cost of a bolt can reach $560. Since most apparatus is made of austenite steel, it is susceptible to corrosion from polythionic acid. One protection against corrosion may be cleaning with 5% soda ash solution.

34370

PERSPECTIVE. Chem. Age (New York), 103(2725):11-12, 20, Oct. 8, 1971.

The removal of lead from gasoline should have little long-term effect on the European chemical industry, although ethylene and aromatics prices may fluctuate between 1975-1980. However, the flexibility of European refineries and improvements in reforming technology could allow increased aromatics production at present costs. Demand for naptha as feed for catalytic reformers may result in a slight tightening of supply. For the petrochemicals industry, this will be offset by the reduced value of low octane light naptha likely to be offered to the industry. Reduction in lead levels will create a $50 million/yr market for catalytic exhaust afterburners and also major opportunities for processes and catalysts to produce alternate octane boosting components. Legislation is being enforced or is impending to control or reduce the amount of lead in gasoline in Sweden, West Germany, France, and the USSR. There are still no lead-free fuels on sale in Europe and only a few reduced leaded fuels, as higher-octane and higher-priced products have been the main priority of oil companies.

34828

Culberson, S. Frank, T. E. Ware, Jr., and John R. Dosher

PRODUCTION OF UNLEADED GASOLINE. Pace Co. Consultants and Engineers, Houston, Tex., 121p., July 8, 1970. 2 refs. NTIS: COM-71-00566

Increased costs of producing reduced-lead or unleaded gasoline were derived for seven combinations of reduced lead and/or octanes for each of three refining situations: a 200,000 barrels-per-stream-day Gulf Coast refinery; a 15,000 B/SD mid-continent refinery; and an 80,000 B/SD west coast refinery. Economics were also developed for two new refineries producing high yields of present specification gasoline (with lead) and 90 research octane number unleaded gasoline, respectively, in order to determine the cost of producing extra volumes of gasoline that would be needed for certain exhaust emission control strategies, e.g., thermal converters and lower-octane gasoline. In general, the costs of reduced-lead gasoline are lower for the 80,000 B/SD refinery, most expensive in the 15,000 B/SD refinery, and intermediate for the 200,000 B/SD refinery. The amount of aromatics and the motor octane number of unleaded gasoline are important factors affecting cost changes. The high production costs in a small refinery would put small refiners at a severe competitive disadvantage and possibly force some closings.

K. STANDARDS AND CRITERIA

06861

K. Yoshida, H. Oshima and M. Imai

AIR POLLUTION AND ASTHMA IN YOKKAICHI. Arch. Environ. Health 13 (12), 763-8 (Dec. 1966).

In Yokkaichi (in the central part of Japan along the Pacific coast) where electric power stations, oil refineries, and petrochemical plants exist, growing numbers of bronchial asthma patients have been observed since the plants were put in operation. At Isozu district, where air pollution is the most severe, the prevalence of bronchial asthma involved 2.3% of the total population and 7.1% of inhabitants over 40. Studies covering the whole of Yokkaichi reveal that the average value of sulfur dioxide by the lead-peroxide method in 13 districts was directly proportional to the prevalence of bronchial asthma. The results of skin tests (house dust) showed positive reactions for only 6.4% of the asthmatic patients in contrast to classical asthma, in which positivity is 50%-90% in Japan. These results suggest that Yokkaichi asthma differs from classical asthma. As for chronic bronchitis, increasing numbers of cases were found by mass screening techniques in polluted districts. There were two to six times as many as in nonpolluted districts. The number of cases of obstructive impairment among the inhabitants was also increased two to six times.

07491

Takaoka, Y.

STANDARD FOR STACK GAS EMISSION. Text in Japanese. J. Jap. Petrol. Inst. (Tokyo), 7(2):100-102, Feb. 1964.

The regulations for air pollution established in 1962 are studied from the point of view of the petroleum industry. The regulation calls for a maximum allowable concentration of dust from heating furnaces of 0.7 g/cu. m. and from catalytic regenerative furnaces of 1.0 g/cu. m., both using a cyclone for dust collection. The regulated concentration of SO2 or SO3 gases is 0.28%. The relation between SO2 production and the quantity of excess air required to burn liquid fuel is graphed. Data for gaseous fuels are given indicating that for crude petroleum gas and for the gas given off by apparatus designed for improving the quality of gases, an air pollution problem does not exist, but the gas emitted from contact decomposition equipment or H2S-producing equipment causes problems. The diffusion theory is explained briefly with a graph showing the relation between wind velocity and concentration and includes a table showing the relation between velocity, temperature, and effective chimney height for an actual height of 45.7 m.

08038

GUIDEPOSTS ON AIR QUALITY CRITERIA FOR SULFUR OXIDES. Air Eng., 9(6:24-27, June 1967.

Guide-posts issued by the Department of Health, Education and Welfare to determine the levels of sulfur oxides concentration that will prevent harm to health are reviewed. The data show that if sulfur oxides concentrations are reduced to levels that will protect health, the effects on vegetation will be eliminated, visibility will be appreciably improved, and damage to materials will be markedly reduced.

L. LEGAL AND ADMINISTRATIVE

05571

F. N. Frenkiel

AIR POLLUTION IN THE GROWING COMMUNITY. Proc. Symp. Cleaner Air Urban Areas, Philadelphia, Pa. pp. 1-15 (1956).

Like any living being, a living community breathes. Its automobiles, railroads, home heaters, rubbish disposals, industry, power plants....all inhale air and exhale polluted air into the atmosphere. Here, Dr. Frenkiel discusses methods for studying the relative contributions of various pollution sources to a community's pollution problem, the increase of pollution in a growing community, and the effectiveness of certain methods for reducing pollution. He explains how a mathematical treatment can clarify the interplay among the many features of a community that contribute to its general air pollution problem - the location and density of pollution sources, meteorological conditions, community geography, and control measures. The main object of these mathematical studies, he points out, is to determine the probable patterns that pollution will take, and the contribution of each source to the pollutant concentration at any given location. He cites a study of this sort made using as an example of Los Angeles County. This mathematical treatment, or 'model', then helps determine what measures must be taken when atmospheric pollution threatens to reach emergency levels, how effective various pollution control plans might be, what effect a new source might have on the pattern of concentration, forecasts of patterns that would result from contemplated urban expansion, and the effect of urban planning on predicated pollution levels.

07235

R. Langmann

CLEAN AIR MAINTENANCE-A TASK FOR THE OFFICE OF PUBLIC HEALTH. Die Reinhaltung der Luft als Aufgabe des Gesundheitsamtes. Oeffentl. Gesundheitswesen (Stuttgart) 29 (3), 126-34 (Mar. 1967). Ger.

Government regulations request that the office of public health pays attention to the maintenance of clean air. More specifically, it must screen projected industrial enterprises as to the degree of their expected air polluting emissions and the eventual impact on the health of the employees and the neighboring inhabitants. In cases where the office of public health through its investigations finds evidence of health hazards, it must recommend various ways of avoiding or eliminating the pollution of air. A large number of pollutants are discussed, such as dust, toxic gas- es, and obnoxious vapors and odors. Their sources and methods for their elimination are discussed in detail and represented by examples. Particular emphasis is placed on proper city planning, zoning, and a more stringent application of regulations concerning the construction of new plants, especially their chimneys. Further investigations into possibilities of remote heating and of substituting gas and electricity for coal are recommended. Finally, the importance of educating the public on the consequences of air pollution is stressed.

08299

Arai, Kenya

TECHNOLOGY TO CONTROL AIR POLLUTION IN THE PETROLEUM REFINERIES. Text in Japanese. Nenryo Kyokaishi (Tokyo), 46(485):669-679, Sept. 1967.

The problem of air pollution has become very troublesome. Plant operators, engineers, smoke-control officers, executives and others, are doing their best to abate and control air pollution. Air pollution control in petroleum refineries is described. The law for air pollution control and administrative guidelines for investigations dealing with the control of industrial public nuisances are stated. The main sources of air pollution from petroleum refining as well as sulphur balance at these refineries are described. Desulfurization and sulphur recovery are discussed.

08686

Harris, D. N.

REDUCING SULFUR EMISSIONS. Combustion, 39(5):36-38, Nov. 1967.

The status is presented of the following programs carried out by APIs Subcommittee on Sulfur: stack removal of SO2; reactions of sulfur oxides in stack plumes, ambient air monitoring and data analysis; engineering study of New York City air quality situation; and desulfurization costs - residual fuel oil. The conclusions reached from each program are summarized.

08888

Katz, M.

NEW TECHNOLOGIES-AIR. In: Pollution and Our Environment: Conference Background Papers. Vol. 3, Montreal, Canadian Council of Resource Ministers, Paper D23-2, p. 1-34, 1967. 26 refs. (Presented at the National Conference, Canadian Council of Resource Ministers, Montreal, Oct. 31-Nov. 4, 1966.) Available from the Canadian Council of Resource Ministers, 620 Dorchester Boulevard West, Montreal, Canada, $10.00 per volume.

Advances that have taken place in a number of European countries, U.S.S.R. and the United States in research on methods of sampling and analysis of air pollutants, in the isolation and identification of complex chemical substances from the polluted urban environment, in engineering control procedures and in the accumulation of knowledge on the effects of pollutants on materials, vegetation, animals and humans are reviewed. Standards for sources of emission and for ambient air quality are being established in an increasing number of countries on the basis of criteria concerning the harmful effects of pollutants at various concentration levels and conditions of exposure. However, re- search in the various environmental sciences that are encompassed within the broad field of air pollution and its control is being conducted in Canada on a very limited and inadequate basis. Recommendations for the role of the federal government and urgent problems that require investigation are presented with the hope that constructive action to remedy the situation will develop.

09289

Williams, N.

AIR POLLUTION UNDER GOVERNMENT OF SASKATCHEVAN. In: Pollution and Our Environment: Conference Background Papers. Vol. 2, Montreal, Canadian Council of Resource Ministers, Paper B8-2, p. 1-7, Jan. 1967. (Presented at the National Conference, Canadian Council of Resource Ministers, Montreal, Oct. 31-Nov. 4, 1966.)

The Air Pollution Control Act, 1965, essentially divides responsibility for air pollution control between the provincial and municipal authorities. Municipalities are given responsibility for the control of the simpler sources of air pollution - fuel burning equipment, incinerators, and open fires - while the province has responsibility for the control of industrial sources of air pollution. If a municipality fails to meet its obligations, the province can enforce its regulations. The Act was drafted in such a manner that the various parameters of air pollution would be defined in the form of regulations. The Act also permits regulations to be made concerning submission of plans, and the control of air pollution from motor vehicles. The Occupational Health Branch, is the agency at the provincial level made responsible for air pollution control. At the time of writing there are no organized programs in operation other than dustfall studies in Regina and Saskatoon. The full air pollution control program will be started as soon as the necessary staff has been obtained. Most of the laboratory and field equipment necessary to implement the approved air pollution control program has been obtained.

09294

Katz, Morris

REGIONAL AIR POLLUTION CONTROL. In: Pollution and Our En- vironment: Conference Background Papers. Vol. 2, Montreal, Canadian Council of Resource Ministers, Paper B-17-2-2, p. 1- 18, Jan. 1967. 6 refs. (Presented at the National Conference Canadian Council of Resource Ministers, Montreal, Oct. 31- Nov. 4, 1966.)

Canadian experience with the control of major air pollution prob- lems has been based on regional rather than local considerations. Although there is a growing awareness in Canada of the import- ance of air pollution control research on criteria and standards of air quality is sadly lacking. Presently the best that can be done is to use as guides the standards adopted by other countries. Such practice has serious deficiencies as standards developed in other countries may not be applicable to Canadian problems.

09351

Watson, John H.

CAPITAL EXPENDITURES FOR POLLUTION ABATEMENT. Conf. Board Re- cord, 4(9):27-30, Sept. 1967. (1) ref.

Capital expenditures of 392 companies show that, in the aggregate, they invested 171 million dollars in pollution abatement equipment in 1966, and expect to invest about 291 million dollars in 1967. Expenitures for air pollution control was 49.6 percent of the total expenditure for air and qater pollution control in 1966. In the durable goods industries, substantially higher commitments were made for air control in 1966 by companies in these groups: primary nonferrous metals, machinery (except electrical), motor vehicles and equipment, transport (excluding motor vehicles), stone clay and glass, instruments and photographic equipment.

09687

P. Sutton

AIR POLLUTION IN PETROLEUM REFINING. Chem. Process Eng., 49(1):36-38, Jan. 1968. 9 refs.

The statute law relatint to air pollution is wide in coverage but not too onerous in its requirements. The author discusses common law as it affects the pollution of air, and considers in detail the two statutes applicable in petroleum refining-the Alkali and the Clean Air Acts.

09702

Indianapolis Common Council, Indiana

GENERAL ORDINANCE NO. 109, 1967: AIR POLLUTION. (AN ORDINANCE FOR THE CONTROL OF THE ATMOSPHERE IN THE INDIANAPOLIS AREA.) 48p., Dec. 15, 1967.

Permitting or causing the emission into the outdoor atmosphere of air contaminants in such quantities and of such duration as to be injurious to humans, plant or animal life, or to property, or which unreasonably interfere with the comfortable enjoyment of life and property is prohibited. Scope and definitions, administrative procedures, legislative procedures, equipment, fees, emergency procedures, rule-regulations, standards and penalties are stipulated.

10689

Mckee, Herbert C.

PREFERENTIAL TAX TREATMENT FOR POLLUTION CONTROL EXPENDITURES: ENGINEERING CONSIDERATIONS. J. Air Pollution Assoc., 18(9):596-599, Sept. 1968. (Presented at the 61st Annual Meeting of the Air Pollution Control Association, St. Paul, Minn., June 23-27, 1968, Paper 68-101.)

Preferential tax treatment has been advocated as a means of reducing the cost to industries for installation of air and water pollution control equipment, and several states have already adopted such tax rates. Decisions of this nature should be matters of public policy, to be decided by the appropriate legislative bodies at state and federal levels. However, several engineering considerations should enter into a determination of such policies. Preferential tax rates are usually proposed because many industries are now faced with large expenditures for pollution control which possibly should have been made gradually over the past several years. This policy can be justified on a short-term basis to decrease the immediate cost to the industries involved. In addition, the long-term effects of such a policy should also be considered. Most of the present or proposed laws apply only to filters, scrubbers, precipitators, and other supplementary devices for pollution control, but do not apply to process modifications which prevent pollution problems and make such supplementary devices unnecessary. Therefore, the long-term effect of preferential tax rates may be to increase the total cost of producing various manufactured items. Such rates may also act to subsidize process changes which enhance a company competitive position in the industry. Such rates may also be undesirable from the standpoint of conserving natural resources. Specific examples are given to illustrate these considerations. (Author's abstract)

11074

Chass, R. L., Krenz, W. B., and Dickinson, J. E.

AN APPRAISAL OF RULE 66 OF THE LOS ANGELES COUNTY AIR POLLUTION CONTROL DISTRICT. Preprint, Los Angeles County Air Pollu- tion Control District, 22p.,

1968. (Presented at the 61st Annual Meeting of the Air Pollution Control Association, St. Paul, Minn., June 23-27, 1968, Paper 68-46.)

Emissions of organic solvents to the atmosphere of Los Angeles County Air Pollution Control District (APCD) are currently estimated at 600 tons per day. In order to reduce these emissions Rule 66 was enacted on July 28, 1966, after more than a year of joint effort by industry and the APCD. The provisions of rules 66, 66.1, and 66.2 are explained as well as how their enforcement will affect industry and the entire community, and discusses the methods being utilized by industry to bring its various operations into compliance. (Authors' abstract, modified)

11242

M. C. Manderson

SULFUR OUTLOOK INTO THE EARLY 1970'S. Preprint, Arthur D. Little, Inc., Cambridge, Mass., ((28))p., 1968. (Presented at the 61st Annual Meeting, American Institute of Chemical Engineers, Symposium on Sulfur, Sulfuric Acid and the Future, Part I, Los Angeles, Calif., Dec. 1-5, 1968, Paper 5-A.)

In 1967, the United States consumed 9.3 million long tons of sulfur equivalent. Ninety percent of the total amount of sulfur consumed was in the form sulfuric acid. The major end uses of sulfuric acid were used in producing nitrogenous and phosphatic fertilizers. The Free World increase in sulfur consumption has been higher than that of the United States since 1950, 51% per year compared with 3.6% per year. Over the next seven years Free World consumption is expected to grow at 5% per year, from the 1967 level to 36 million long tons to 39 million long tons. About 5.5 million long tons of new sulfur capacity will emerge outside the United Sates over the next 2 1/2 years. Sulfur production in U. S. will grow from the 1967 level of 9.3 million long tons to 14.1 million long tons by 1970 and to 15.8 million long tons by 1975. The amounts of sulfur from lower cost sources will be adequate to meet U.S. needs by 1970, including net exports of one million tons per year. It is believed that sulfur prices will seek lower levels which are more in line with mimimum return requirements.

11352

Public Health Service, Arlington, Va., National Air Pollution Control Administration

REPORT FOR CONSULTATION ON THE METROPOLITAN LOS ANGELES AIR QUALITY CONTROL REGION. 79p., Nov. 1968. 45 refs.

A report on a study of the Metropolitan Los Angeles urban area is presented. Data on topographic features and meteorology are given. Studies on the locations of emission sources and the kinds and quantities of pollutants emitted are reported. Information on current industrial, commercial, and residential land use, transportation systems, and population density is presented. An evaluation of estimated patterns of future trends in land use and population density is made.

14144

Amero, R. C. and R. P. Foster

IMPACT OF THE FAST-GROWING GAS TURBINE MARKET ON REFINERY FUTURES. Proc. Am. Petrol. Inst., Sect. III, vol. 49:281-308, 1969. 26 refs.

The purpose of the study is to alert the petroleum refiner to the importance of including flexibility into future process design so that not only gasoline but also the expanding turbine fuel requirements can be satisfied. Gas turbines are the dominant power plant in the expanding aircraft industry and are also well accepted as prime movers for electrical generators, pumps, and compressors. The experimental stage of marine application is ending and commercial acceptance is starting. Increased use of gas turbines for mobile equipment will follow, starting first with large equipment such as commuter trains, mining and logging equipment, and trucks. A 1980 market for 500,000 barrels per day of distillate fuel for nonaircraft gas turbines is likely. This number was predicted primarily from utility peaking plants and marine use, but includes total energy, transportation, pumping, and other industrial uses. Installations using several hundred barrels per day will not be unusual, where the turbines will be tailored to some degree to burn heavier or more aromatic distillates or other fuels that offer a price advantage. In the U. S., the large turbines using natural gas, blast furnace gas, and other fuels will outnumber those using distillate fuel. In sizes below 1000 hp, the 1980 gas turbine count will still be less than 2% of the diesel and gas engine population. Fortunately, the engines and turbines both prefer clean-burning fuels of low aromatic content, and this is also the direction that distillate fuel quality will take because of air pollution controls.

14798

Liedmeier, G. P.

PREVENTION OF ATMOSPHERIC POLLUTION IN PETROLEUM REFINERIES. (La prevention de la pollution atmospherique dans les raffineries de petrole). Text in French. Pollut. Atmos. (Paris), 11(Special):3-8, Feb. 1969.

A review of atmospheric pollution and problems in controlling it in the refineries of Europe is presented. The author discusses the founding of CONCAWE (Conservation of Clean Air and Water-- Western Europe), which is a group of oil companies and societies representing 80% of the refining capacity in Western Europe. Its functions are to process information pertaining to pollution by refineries and the joint study of pollution problems. It now has working groups in the following areas: study of the height of chimneys and atmospheric dispersion; liquid effluents; petroleum pipelines; subterranean migration of petroleum; and noise abatement. The sources and effects of refinery pollution, particularly by sulfur oxides, hydrocarbons, and malodorous gases are reviewed. Particulate matter and nitrogen oxides are considered of secondary importance. A brief review of methods for combatting pollution is also included.

17927

Thayer, J. M.

THE CONTROL OF GRIT, DUST, AND FUME EMISSIONS FROM INDUSTRIAL PROCESSES. Conf. Filtration Soc., Dust Control Air Cleaning Exhibition, London, 1969, p. 10-15. 8 refs. (Sept. 23-25.)

Atmospheric pollution from industrial sources in England and Wales are controlled in part by the Clean Air Acts of 1956 and 1968 and the Alkali Act of 1906. The 1956 Clean Air Act prescribes standards for the emission of smoke from chimneys and prohibits smoke darker than Ringelmann 2, except for certain specified periods. The 1968 Act adds to this by prohibiting the emission of dark smoke from industrial and trade premises as distinct from chimneys. The 1956 Act deals with dust and soot only in general terms. The 1968 Act, covering emissions of grit and dust from furnaces, applies to a wide range of furnaces burning solid, liquid, or gaseous matter, excluding small domestic boilers. The recommended standards for furnaces burning fuel equivalent to 100 to 50,000 lb per hour of coal are illustrated graphically. Recommendations are also offered for

reducing grit and dust emissions from cold blast cupolas at iron foundries. These involve minimizing emissions by suitable arrestors fitted at the top of the shaft or dispersing fumes from chimneys not less than 120-ft high. The Alkali Act is a measure to control emissions from virtually all the heavy chemical industries, the fine chemical industry, petroleum refining, and petro-chemicals, nonferrous metallurgy, iron and steel production, power stations, coke and gas works, and certain ceramic and lime works. The Act provides for the establishment of grit, dust, and fume emission standards and requires suitable equipment for obtaining these standards. Arrestment to a specific standard by dispersal of waste gases at inadequate height is given in some detail for cement works, iron and steel works, lead works, and electricity works.

19336

Hockin, L. E.

PRESENT LEGISLATION AND POSSIBLE FUTURE TRENDS IN AIR POLLUTION CONTROL. Preprint, Inst. of Mechanical Engineers, London, (England), 7p., 1968. 4 refs. (Presented at the Symposium of the Institution of Mechanical Engineers, London, England, Oct. 17-18, 1968.)

Air pollution legislation in England and Wales is reviewed with special reference to the Alkali Acts, the first of which was passed in 1868, to control the discharge of hydrochloric acid from the Leblanc process for manufacturing sodium carbonate. Over the years, the act was extended to include more processes and more noxious or offensive gases, the extensions resulting in the Alkali & Works Regulation Act of 1906 and the Alkali & Works Order of 1966. At the end of 1967, 1828 works involving 3031 separate processes were registered under the act. The essence of the act is that all scheduled works must use the best practicable means to curb emissions; plants are judged not by the measures they have taken but by the degree of success they achieve in practice. Inspection of a registered works is carried out continually and usually without notice. The other main acts controlling air pollution are the Public Health Act of 1936, which empowers local authorities to specify abatement procedures for a specific emission source, and the Clean Air Act of 1956, which gives local authorities the right to control emissions of smoke, dust, and grit from fuel combustion, to control chimney height, and to set up smoke control areas. A Clean Air Bill currently before Parliament would bring a wider range of furnaces under the control of the grit and dust provisions of the Clean Air Act and establish a more comprehensive system of controlling chimney height. New Alkali & Works Orders will likely have specific provisions for oil refineries and petrochemical processes, mineral processing, odors from the processing of animal wastes, and primary aluminum smelting.

23562

Damon, W. A.

THE TREATMENT OF WASTE GASES IN CHEMICAL INDUSTRY. Trans. Inst. Chem. Engrs. (London), 31(1):26-35, 1953. 16 refs. (Presented at the Institute of Chemical Engineers, Midlands Branch Meeting, England, Jan. 31, 1953.)

Statutory control of the atmospheric pollution arising from certain industrial processes is considered, and the possible means of implementing the requirements of the Alkali Act are discussed. Processes are described in which the control of pollution is difficult, and the means adopted to mitigate their effects are explained. The rate at which a gas diffuses when travelling downwind from its point of emission depends on the turbulence of the atmosphere, and this in turn is affected by the wind speed and the temperature gradient. Calculations of Bosanquet and Sutton relating to maximum ground concentrations and chimney discharges are cited. Cement manufacture, pollution by sulfur gases, petroleum refining, requirements for lead works, and various unregistered processes are discussed. Great difficulty has been experienced in the case of a plant for the recovery of magnesia from sea water, by reason of the discharge of a very foggy emission from the kiln chimneys. The discharge of fluorine compounds, coal combustion, pollution by coke ovens, and burning spoilbanks are also considered.

24949

Behle, Calvin A.

INDUSTRY-THE VIEWS OF THE REGULATED. Arizona Law Rev., 10(1): 74-80, Summer 1968. 19 refs.

Scientific evidence is brining home the fact that perhaps one-fifth or less of the principal atmospheric pollutants in the United State is released from manufacturing plants, including electric power generating complexes. However, industry has shared the irresponsibility of the rest over the decades, and the law books contain many interesting reports of the litigation which hammered out the available legal remedies. In addition to invocation of the law of nuisance, other remedies available and effectively employed were actions sounding in trespass for damage to real property, trespass on the case, and the newer and somewhat more difficult but flexible action of negligence. Among the principal considerations involved in the choice of remedies would be the applicable statute of limitations in the particular forum. Cases are cited which pertain to smelters, oil refineries, aluminum interest, and many other lawsuits arising out of mining and earth processing operations. The National Association of Manufacturers feels that the federal role should emphasize the necessary research and development to prevent and control air pollution, making possible the establishment, scientifically, of criteria to define which levels of pollutants are harmful. Then, the executive branch of the government should have the responsibility of 'leading' rathe than 'driving' the states and communities to abate and control air pollution.

25305

Graaf, H. de and J. W. Tesch

AIR POLLUTION IN AN AREA OF RAPID INDUSTRIALIZATION. World Health Organization, Copenhagen (Denmark), Regional Office for Europe Proc. Public Health Aspects Air Pollution Europe, Milan, Italy, 1957, p. 208-218. 3 refs. (Nov. 6-14.)

Complaints about air pollution in Rotterdam led to the establishmen of the Rotterdam Soil, Water and Air Committee with special subgroups to investigate emissions from fluoride-producing industries, incinerator plants, oil refineries, smoke-producing installations, and small industries and restaurants. Each group advises management about the possible hazards posed by emissions and suggests appropriate control measures. Other activities of the Committee include regular pollutant measurements, rainwater analyses, twice weekly air sampling, hourly smoke sampling, mortality studies, clinical studies of patients with chronic bronchitis, and examinations of diseased cattle and damaged vegetation. Despite measures of eliminate fluorides from stack gases, their presence in even small concentrations is harmful to plants. Since rain-gauge samples near two phosphate plants contained less fluorides than samples collected in the center of Rotterdam, the presence of another source of fluoride pollution is suspected. Investigations are under way to determine if it is the coal used by power plants and several industries.

27184

Yokohama Center for Public Nuisance (Japan)

POLLUTION PREVENTION CONTRACTS I. (Kogai boshi keiyaku dai 1 pen). Text in Japanese. Yokohama Center for Public Nuisance Rept. no. 25:1-119, May 1970.

Since not much authority is given local autonomous bodies, all they can do in preventing pollution is give administrative guidance to the enterprises, without, however, binding force. Yokohama city decided to sign a contract with the enterprises. The important item common in these contracts is that the enterprises shall take sufficient measures in preventing pollution. When pollution does occur, despite these measures, solutions must be made on the responsibility of the enterprise. The city can direct the enterprise on preventing pollution. When no directive is given, th city will take measures on behalf of the enterprise, and the expens shall be borne by the enterprise. Since the start of this system, the citizens' movement has quieted down. Correspondence between th mayor and the enterprises, numbering 15, including power generation oil refinery, gas, chemical and industrial, and the agreements signed between the mayor and the enterprises are included in the pamphlet, as well as the sales contract of the reclaimed land at Yokohama harbor, signed by more than 200 enterprises concerned in order to prevent pollution such as noise, vibration, filthy water, effluent, smoke, dust, gas, and odor. The exchange of correspondence indicates the proposal made by the city and counterproposals, and pledges made by the enterprises. The first contract was with a thermal power generating station, the construction of which started a citizens' campaign against it. Yokohama city, since 1956, has measured dust fall and sulfur dioxide, and dealt with complaints concerning pollution from May 1961, entrusted by the prefectural government. In April 1964, the Pollutions Subsection became independent. When the subsection proposed to change the site of the thermal power station, arguments were stirred up. Since then, the city requested the cooperation of scholars and the meteorological station, and was fully armed with pertinent and scientific data when proposals on contracts with enterprises came to be made and agreed to.

27185

Yokohama Center for Public Nuisance (Japan)

ON FACTORY POLLUTION. (Kojo kogai o kangaeru). Text in Japanese. Yokohama Center for Public Nuisance Rept., p. 1-13, June 1970.

In the Tokyo-Yokohama area, there are nearly 100,000 factories, including heavy industry, such as automobiles, metal products, and iron and steel. In 1968, there were 520 cases of pollution reported: 245 on noise; 92 bad odor; 71 sooty smoke; 47 poisonous gas; 28 vibration; 18 waste liquid; 9 dust; and 10 others. They were handled by the Pollution Center and Public Health Clinic. The National government has authority over power generating stations, city gas manufacturing, and almost all authority over the oil refinery and petro-chemical industry; local government has only limited authority for other types of factories. Kanagawa prefectur is responsible for planning a pollution prevention program for a special area in the prefecture, and under the Air Pollution Prevention Law, under special circumstances, it is responsible for supervising factories which have smoke emitting facilities, as well as control over high pressure gas. For certain waters, the prefecture is responsible for maintaining water quality under the Water Quality Control Law. The prefecture is responsible for makin big factories take urgent measures on fuel control, but Yokohama city is responsible for watching the situation of air pollution constantly, controlling poison gas spreading on the ground, noise, and boiler and exhaust gas from automobiles. Twenty employees work at the City's Pollution Center. Yokohama city became famous for first signing the agreement with factories which may be sources of pollution, as well as establishing the constant checking system and centralized control system. Citizens were invited to see some of the surveys being conducted. Experience gained enabled the city to forecast pollution, so that the predicted air pollution by sulfur dioxide was close to the actual one, under certain conditions. A few cases of noise and waste liquid from a plating factory are cited. The city, after being consulted by the citizens, acted as a intermediary in the solution of these cases.

29420

Yoshida, Katsumi

AIR AND WATER POLLUTION IN YOKKAICHI: ON THE PROBLEMS OF ENVIRONMENTAL DISRUPTION AND ITS CONTROL IN JAPAN. Mie Med. J., 20(1):1-20, 1970. 3 refs. (Presented at the Training Program of Regional Development, 2nd, Chubu Centre, U. N. (Nagoya, Japan), Jan.-May 1970 and to the Science Council, Committee on Environmental Disruption, Yokkaichi, Japan, March 1970.)

Kogai is the legal and popular word for public nuisance, referring to almost all the undesirable side-effects in the environment. The problem of public nuisance was brough out in 1962 with the problem of Yokkaichi asthma which was caused by severe air pollution originating in the Yokkaichi petroleum production and refining industry. Residual heavy oil was widely used instead of coal. Also, chimneys were not high enough to attain satisfactory gas diffusion. Increases in bronchial asthma, chronic bronchitis, and emphysema have occurred, as well as water pollution. Several control acts and a relief act for sufferers of obstructive lung diseases have been established. Both local and federal governments have passed regulations and ordinances. The relationship of various petroleum combines to seasonal wind directions, districts, obstructive lung diseases, sulfur dioxide, sulfuric acid mist, and ground concentrations are discussed. Automatic monitoring stations for SO2 have been set up using electroconductivity estimations, and pollution alarms can be given. Air quality criteria must consider ages and sicknesses. Also, the relief measures from medical damage has become a social problem. Laws, regulations, and standards are given for the ambient air quality, emission controls, prevention, smokes, chimney height, automobile exhaust, sulfur oxides, and water. Desulfurization of stack gas and heavy oil and the calculation of diffusion are also mentioned.

30908

Vogel, Hans

MAN, HIS ENVIRONMENT AND THE TECHNOLOGY. PARTS II AND III. (Der Mensch, seine Umwelt und die Technik). Text in German. Chem. Rundschau (Solothurn), 24(15):305, 307, April 14, 1971. and 24(16):322, 324-325, April 21, 1971.

In 1970, President Nixon created the three-member Commission for Environmental Protection and assigned it the task of working out legal and administrative measures for a better environment. By 1980 air polluting automobile exhausts will be reduced by 93%. In August 1970, a Commission for Combatting Air Pollution was created in Tokyo. NATO established a council in 1969 to study the effects of technology on the environment and man. An international academy for the protection of life and the environment will be created in Luxemburg later in 1971. In West Germany, a cabinet subcommittee for environmental problems, under the chairmanship of the Minister of the Interior, was created. Presently, West Ger-

many spends $1.5 million to combat air pollution. As of January 1, 1972, refineries in West Germany must reduce the lead content of gasoline to 0.4 g/l. Postponement to 1975 is likely, however, if reduction becomes too costly or too complicated for the refineries. Environmental protection concerns not only governments and industries, but requires the cooperation of the public. The subject should be included n school curricula.

31059

Glazer, Norman

EMERGENCY SOURCE ABATEMENT PROCEDURES FOR A HIGH POLLUTION PERIOD, CITY OF PHILADELPHIA. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1971. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-123.)

The city of Philadelphia is in the process of formalizing action plans for various pollution sources designed to produce a swift but orderly stabilization or reduction of the pollutant buildup. Those sources of pollution for which action plans are being formalized include the public utilities, major industries such as oil refineries, chemical plants, and metal processors, municipal operations, mobile sources, and residential and commercial sources. Among the actions recommended are reduction of electrical and heating demands, minimization of incineration, minimization of vehicular traffic and, should the situation increase in severity, shutting down all major industrial emission sources. All safety requirements must be followed and indiscriminate actions must be avoided so as not to jeopardize the safety of either workers or equipment. Where possible, substitutions such as gaseous for liquid fuels or in the case of electrical generation, maximized usage of hydroelectric or combustion turbine power are emphasized. The Air Management Program in Philadelphia is aimed at minimizing daily emissions to the atmosphere to the limit of current technology. It is hoped that by accomplishing this, abatement procedures for High Pollution Periods will never be needed. (Author abstract modified)

32796

Wada, Masaru

ON ENACTMENT OF OFFENSIVE ODORS CONTROL LAW. (Akushu boshiho no sentei ni tsuite). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(9):780-787, Sept. 1971.

The statistics of complaints made against bad odors in 1969 indicate that 38.0% of the total was made against stockfarming, animal offal treatment and fishmeal plants; 36.6% against oil chemical factories and Kraft pulp mills; and 8.6% against sewage treatment plants and waste disposal incinerators. Detailed tables of statistics are included. The Odor Control Law, issued on June 1, 1970, its purpose, odor producing materials, definition of odor producing areas, and other items in the law are reviewed. Currently available deodorizing methods include the gas cleansing method, effective for water, ammonia, low molecule amines, low molecule fatty acids, acidic alkalines, hydrogen sulfide, mercaptans, sulfides and high molecule amine fats, applicable to agriculture and stockfarming, sea products manufacturing, and urban sanitation facilities. The ozone oxidation method is effective for nonsaturated organic chemicals, hydrogen sulfide, mercaptans, amines, aldehyde-sulfides and is applicable to sewage treatment plants. The direct combustion method is effective for oil refineries and oil and fat treatment factories. The catalytic oxidation method is effective for hydrocarbons and applicable to paint-varnish solution mixing, oil-fat processing, pharmaceuticals, resin manufacturing, animal cadaver incinerators, and sewage treatment plants. The adsorption method is effective for alcohols, fats, acids, benzene, mercaptans, and oil, applicable to fishmeal plants, fertilizer plants, pharmaceutical plants, propane gas filling plants, and vacuum cars. The air oxidation method is good for hydrogen sulfide and is used at oil refineries. The soil oxidation method is good for ammonia and amines, and is applicable to poultry farms. The ion exchange resin method is effective for sewage treatment plants.

32893

Hattori, Taira

OFFENSIVE ODOR CONTROL ADMINISTRATION TODAY AND TOMORROW. (Akushu kogai gyosei no genjo to tenbo). Text in Japanese. Yosui To Haisui (J. Water Waste), 13(8):957-961, Aug. 1971.

The provisions of the Offensive Odors Prevention Law in Japan, enacted June 1, 1971, and the controversies surrounding it are reviewed. The law designated criteria to control respective substances contributing to offensive odors but not the odors themselves, since unpleasant odors are generally a complex combination of two or more odorous components. The sources of the offensive odors (oil industry, paper pulp industry, stock raising) are easily specified, and the representative odor generating substances are also easily determined; control of these substances, e.g., methyl mercaptan or ammonia, effects a control of the odors. Controls of specific components rather than general odors are more effective with respect to legal factors. Evaluation of an offensive odor by a human panel is not irrefutable evidence in a law suit, but instrumental analysis of a known odor-causing substance is accepted.

33786

Stephenson, R. J.

THE FIGHT AGAINST AIR POLLUTION IN GREAT BRITAIN. (La lotta control l inquinamento atmosferico in Gran Bretagna). Text in Italian. Ingegnere (Milan), 45(4):346-349, April, 1971.

The administrative, social, and technical aspects of the air pollution fight in Great Britain are reviewed. The public awareness in the city of London after the smog alerts from the early 1950s contributed to the fact that this metropolis could be referred to as the smoke-free city in 1955. The Clean Air Act approved in 1956 allowed the creation of sections of smoke emission control throughout the country. This act was extended in 1968 when sale of bituminous combustibles became prohibited and the height of smoke emission from chimneys came under contol. None of the two laws, however, provided action against sulfur dioxide, except that the increased hight of the funnels decreased its noxious effects. Monitoring of air pollution is being performed in more than 1200 locations in Great Britain; the information is then coordinated by the Warren Spring Laboratory and the data on smoke and sulfur dioxide is summarized and published monthly. As opposed to the Clean Air Acts, the activity dictated by the Alkali Acts is carried out by inspectors which are designed by the Construction Ministry. Three main groups of industrial plants, the chemical, metallurgical and fuel industries are under direct control of the Alkali Act. The contribution of automotive traffic exhausts to air pollution through sulfur dioxide, carbon monoxide, hydrocarbons and nitrogen oxides is negligible. Their control is provided by standards in terms of admitted smoke limits imposed upon the automotive exhaust. Attempts in the design of new engines for automotive vehicles are in course.

34013

Verleger, Philip K.

THE ENGINEER VS. THE EPIDEMIOLOGIST: THE PLACE OF AIR QUALITY STANDARDS IN THE REGULATION OF AIR POLLUTION. Environ. Affairs, 1(2):360-366, June 1971. 19 refs.

From the beginning, both in its regulations and in the exercise of the permit power, the Los Angeles District has aimed, basically, at getting the maximum of control available, within the limits of available engineering skills, for any operation carried on within the District. It did not attempt first to determine what the level of emission was that caused the problem, and then to adopt regulations directed at bringing emissions down to a level below that. Nonetheless, it embarked on a vigorous program of regulation, adopting rules restricting emission of combustion contaminants, regulating the sulfur content of fuels burned, and, with the development of the theory of photochemical smog, restricting the escape of vapors from refining and distribution of gasoline and the use of solvents. With the discovery of that theory regulatory emphasis in California gradually passed from the County to the State level, and at that point, the concept of standards was first developed. Paralleling this work at the regulatory level, pathologists, toxicologists, and other medical researchers were more or less continually attempting to find ways of detecting effects of various gases at lower and lower levels. It will be necessary to depart from the idea of using any effect as criterion and that some appraisal of the significance of the effect will be needed.

34033

Bermingham, P. E.

CURRENT EMISSION STANDARDS AND THE PETROLEUM INDUSTRY. American Petroleum Inst., New York, Div. of Refining, Proc. Am. Petrol. Inst. Div. Refining, vol. 51:587-610, 1971. 86 refs. (Presented at the Midyear Meeting, 36th, San Francisco, Calif., May 12-14, 1971.)

Environmental laws and regulations applicable to petroleum refining are discussed from a legal point of view. Effluent discharges as affected by the Water Pollution Control Act and its amendments are discussed, as well as oil spills affected by the Water Quality Improvement Act of 1970 and impediments to navigation affected by the Refuse Act of 1889. Pending 1971 water pollution amendments are indicated. Refinery emissions into the ambient air as affected by the Clean Air Act and its amendments are considered. National standards are cited for major pollutants and new stationary sources. Fuel composition including lead in gasoline is discussed. Citizens suits, noise, odors, flares and glares, and thermal pollution are mentioned. (Author abstract modified)

34688

California State Dept. of Public Health, San Francisco, Calif., Air Pollution Study Project

CLEAN AIR FOR CALIFORNIA. (INITIAL REPORT). 60p., March 1955. 128 refs.

Based on its initial review of the body of knowledge presently available about the growing problem of polluted air, the California State Department of Public Health recommends that a measurement and control program be developed to remedy the problem of air pollution, with its health aspects paramount. The history of air pollution in California is reviewed, with particular reference to the characteristic effects of smog in Los Angeles. Motor vehicles, oil refineries, fuel oil and gas, gasoline marketing and distribution, refuse incineration and disposal, chemical processing, and other sources of pollution are cited. Dust storms and other rural air pollution problems are also listed. Meteorological and topographical factors are considered for various areas of California. Mortality data, hospital admissions, industrial absenteeism, and mortality statistics are presented. Critical thresholds are cited. Toxic substances and their physiological effects are discussed. Zoning, substitution of materials and methods, improving ventilation, neutralizing the pollutants, and other control methods are listed. Measurement methods are also indicated.

M. SOCIAL ASPECTS

00336

G. Ozolins and R. Smith

A RAPID SURVEY TECHNIQUE FOR ESTIMATING COMMUNITY AIR POLLUTION EMISSIONS. Public Health Service, Cincinnati, Ohio, Division of Air Pollution. Oct. 1966. 83 pp. (Presented at the 59th Annual Meeting of the Air Pollution Control Assoc., San Francisco, Calif., June 20-24, 1966, Paper No. 66-11.)

A technique has been developed for surveying pollutant emissions within a community or metropolitan area in 3 to 6 man-weeks. The methods for conducting such a survey are described in this paper. An important feature of this technique is the concept of reporting zones. The quantities of pollutants released can be assessed not only for the total community but also for different subdivisions of the area. The results are emission maps of a community depicting emission of pollutants in quantities per unit area. Seasonal variations in pollutant concentrations are considered, and emission rates of pollutants can be calculated for specified times of the year. The four major source categories considered are combustion of fuels in stationary and in mobile sources, combustion of refuse material, and industrial process losses. Each category is considered in detail relative to sources of information, seasonal variation in emissions, methods for estimating pollutant emissions by areas, and use of emission factors. Results obtained by application of this technique in two metropolitan areas are summarized. (Author)

14491

Ohira, M., H. Maruya, and T. Nagira

A STUDY OF AWARENESS AND OPINION OF THE RESIDENTS ABOUT PUBLIC NUISANCES IN MIZUSHIMA (NEWLY DEVELOPED INDUSTRIAL AREA). (Mizushima chiku jumin no kogai ni tsuite no ishiki jokyono chosa). Text in Japanese. Nippon Eiseigaku Zasshi (Japan J. Hyg.), 24(1):99, April 1969.

Air pollution has been intensified in Mizushima, due to the introduction of the steel and oil industries. A survey of subjective symptoms and opinion on air pollution was conducted among 182 households in the area regarded as most polluted (called area A) and 88 households in apartments owned by one of companies regarded as a polluter in this area (area B). Complaints such as eye irritation, frequent coughing and expectoration, and malodorous air were heard more frequently at A than at B. People from area A, who once welcomed the introduction of industry, are much more displeased with it than people from area B, who belong to the industry. However, the former are becoming reconciled to this pollution. They do not believe that the local government or industry will control air pollution. Furthermore, they have little confidence in the ability of a civic association to eliminate public nuisances and would rather move out of the area than oppose pollution. On the other hand, people working in the offending industry pay little attention to nuisances. It is concluded that the opposition of residents to public nuisances should be supported by physicians, scientists, and other actively concerned persons.

15760

Lindvall, Thomas

THE NUISANCE EFFECTS OF AIR POLLUTANTS. (Luftfoeroreningars olaegenhetseffekter). Text in Swedish. Nord. Hyg. Tidskr. (Stockholm), no. 3:99-115, March 1969. 11 refs.

Annoyance reactions from odorous and particulate air pollutants were regarded as medico-hygienic problems in Sweden. Legislation in Sweden permits intervention based solely upon subjective annoyance reaction to some extent. Nuisances from industrial plants are usually caused by odors and particulate matter. Complaints were reported in 78% of urban and 27% of rural communities. The medico-hygienic evaluation of nuisance from air pollution includes studies of the dose-response relationship between the pollutant in the ambient air and the extent and strength of the annoyance reaction. The description of the dose is often complicated by the fact that many odorous substances are hard to detect while they still have odor. Therefore, the concentration in the ambient air is often based upon analysis at the source combined with meteorological spreading calculations. From a statistical point of view, there is often a satisfying correlation between predicted and actual concentrations in the ambient air. The organoleptic principle of analysis of odorous emission was used more frequently during the last few years. Odor threshold determinations were successfully used in testing odor abatement equipment and in dose description around pulp mills. The frequency is calculated by which a certain concentration is exceeded at different distances from the source. The description of the dose was satisfactorily worked out by the use of standardized, sociological inquiries with special attention to certain effects of interaction, such as disquising of or differences in attitude. Response studies were undertaken in Sweden around pulp mills and oil refineries. (Author summary modified)

30896

Miyoshi, H., A. Fukuda, and T. Mizuki

EPIDEMIOLOGICAL CASE STUDY ON COMPLAINTS OF ODOR. (Akushu kujo jirei no ekigakuteki kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):143, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)

Questionnaires were sent out to the citizens of Tokuyama City, Yamaguchi Prefecture, in July 1967 and November 1969 as a result of an average of 150 complaints a year against the odor created by the city s petroleum chemical industrial complex. Investigations by monitors and reports on complaints were studied in detail. A total of 42 complaints were reported in January to June in 1969; 112, from July to December 1969; and 63, from January to June in 1970. In each case, time, geographical conditions, descriptions of odor and physical effects, wind velocity, and the emission sources were investigated. Studies were sent to the management of the industry. Requests were made to avoid repetitious offenses, maintenance of repairs, and prevention of gas leakage, and for a better understanding and recognition of air pollution among the factory workers. The city of Tokuyama is offering the results of these

investigations as basic data for industrial complex administration and for gas analyses in the future.

33904

Perrine, R. L.

OIL AND ECOLOGY -- THE NEED FOR A NEW OUTLOOK.

Preprint, American Inst. of Mining, Metallurgical, and Petroleum Engineers, Inc., Dallas, Tex., Society of Petroleum Engineers, 12p., 1970. 39 refs. (Presented at the American Institute of Mining, Metallurgical, and Petroleum Engineers, Society of Petroleum Engineers, Annual Fall Meeting 45th, Houston, Tex., Oct. 4-7, 1970, Paper SPE 2952.)

The nature of the air pollution problem as it pertains to the petroleum industry is considered, and a new educational framework which may make the solution of future problems easier is described. Photochemical air pollution in Los Angeles and the effect of automobile emissions are cited. Automotive emission reduction, the removal of lead from gasoline, and cost estimates for lead removal are considered. The need for a new breed of problem-solver is seen. A Doctor of Environmental Science and Engineering is suggested, which would combine physical, earth, and biological sciences with engineering. There must be an extensive internship program, with work under guidance on important problems in the real, industrial world.

N. GENERAL

04052

R. Haddad and J. J. Bloomfield

ATMOSPHERIC POLLUTION IN LATIN AMERICA. Bol. Ofic. Sanit. Panam. 58, 241-9, Sept. 1964. Sp. (Tr.) (Presented at the Inter-Regional Symposium on Criteria for Air Quality and Methods of Measurement, Geneva, Switzerland, Aug. 6-12, 1963.)

Latin America is an area which is experiencing a very rapid population and industrial expansion. Although this growth is very irregular, the cities which exceed a million inhabitants and the industrial concentration in them is growing yearly. This phenomenon has resulted in serious problems of air pollution in Sao Paulo, Brazil, Santiago, Chile, Mexico City, Mexico, which are in need of further investigation and control as quickly as possible. There are potential problems in Buenos Aires, Argentina, and in all those large metropolitan centres which are growing and industrializing rapidly. The situation created in Lima, Peru, because of the fishmeal industry, seems to be fairly well controlled. The greatest necessity is to train personnel capable of conducting studies in measuring air quality and controlling the contamination of the air. There is also a necessity to create a consciousness of the seriousness of the problem among government authorities and the public in general. It is hoped that the future development of the Institute of Occupational Health and Air Pollution Research in Santiago, Chile, will contribute effectively to achieve these objectives.

04649

Blifford, I. H., Jr. and G. O. Meeker

A FACTOR ANALYSIS MODEL OF LARGE SCALE POLLUTION. Atmos. Environ. 1(2):147-157, March 1967.

Based on data obtained from the U.S. Public Health Service National Air Sampling Network for the years 1957-1961, factor analysis techniques were used to produce a pollution model for 30 U.S. cities. Orthogonal models obtained from Varimax and Quartimax solutions and an oblique solution (Oblimax) were similar. The first four principal factors were tentatively assigned to pollution from heavy industry, automobiles, fuel burning, and petroleum refining on the basis of their chemical composition. These four factors account for about 70 percent of the variance while another 20 per cent appears to be due to widespread use of plating materials. Regression of the derived factors (factor scores) on the 30 sampling locations indicates general agreement with the known character of the sites and with other studies of individual pollution components. (Authors' abstract)

06744

T. Suzuki

AIR POLLUTION IN JAPAN. Kuki Seijo (Clean Air - J. Japan. Air Cleaning Assoc., Tokyo) 2, (2) 1-4, 1964. Jap.

The nature of air pollution in Japan has been changing. Pollution from the chemical industry, petroleum processing, and automobiles has become more prevalent than dust and soot from coal and heavy fuel oil. At present, the degree of air pollution is indicated primarily by the amount of dust and soot fall and concentration of SO2 and floating dust, and secondarily by the concentration of carbon monoxide, nitrogen oxides, and hydrocarbons. Use of heavy oil and coal of very low grade makes the situation worse. General considerations of the effects of pollutants on the human body are given. Studies made by the Yamaguchi Medical School on floating dust and SO2 indicate a correlation between concnetration and death rate. Mention is made of the now familiar 'Yokohama Asthma'. It was found that in Yokkaichi city, air pollution is especially heavy when the wind velocity is greater than 5 m/sec and SO2 is highly concentrated. The death rate from lung cancer in Hokkaido for 1950 to 1960 was 1.6 times as great as the mean value for the rest of Japan. Maximum allowable concentrations of various pollutants are tabulated for the United States, Soviet Union, and West Germany.

09310

Kalika, Peter W.

THE GROWING PROBLEM. Mach. Des., 39(17):19-21, July 20, 1967.

The facts, figures, and concern about the national problem of air pollution are covered. Past air pollution episodes, sources and types of pollutants released in the atmosphere, and the mechanisms and characteristics of temperature inversions are reviewed.

15096

Bassetti, P.

AIR, WATER, AND SOIL POLLUTION AFFECTING THE CITY AND PROVINCE OF MILAN. (L'inquinamento dell-'aria, dell'acqua e del suolo, nei riguardi di Milano e del suo Territorio). Text in Italian. Ing. Sanit., 16(2):88-101, Jan. - Feb. 1968. 7 refs.

Air pollution derives from three principle sources: oil refining and petrochemistry (20%), home heating (60%), and motor traffic (20%). In Milan and Turin, smog in the atmosphere has reduced the lifetime of automobile finishes by 50%. Italy has only recently confronted the air pollution problem, and few Italians realize the high cost of its prevention. A company in the city of Cornigliano has spent 1.5 billion dollars for equipment to combat air pollution. Proper adjustment of home heating equipment would diminish smog by 40% and would give a 20-25% saving on fuel oil. The Italian law of July 13, 1966 divides the entire nation into two control zones: (1) communities in north central Italy with 70-300 thousand inhabitants or special air pollution problems, and insular Italian communes with populations ranging from 300,000 to one million; (2) communities of north central Italy of 300,000 or more and of southern Italy with one million or more. Factories and plants are subject to regulation when their power output is more than 30,000 kcal/hr. No limitations are made on combustible liquids and gases; petroleum distillates such as kerosene and gasoline with 10% or less sulfur; coke with 2% or less of volatile materials and 1% or less sulfur; or coal with 13% or less volatile materials and 2% or less sulfur. Wood and charcoal are prohibited.

Limitations are placed on combustible fluids with more than 5 Engler degrees of viscosity at 50 C and 3% or less sulfur content. Plants must conform to these regulations by December 31, 1969. More than 75% of this article is concerned exclusively with water pollution and the establishment of a 'Po Valley Authority' to deal with water and soil pollution problems of that geographical area.

20548

Dreisbach, Robert H.

AIR POLLUTION. In: Handbook of the San Francisco Region. Palo Alto, Calif., Environment Studies, 1969, p. 284-309. 29 refs.

The major types of air pollutants in the San Francisco Bay area, and their sources and effects, are discussed. Such respiratory diseases as bronchitis, emphysema, influenza, pneumonia, and tuberculosis have a close relationship with the level of air pollution. A strong correlation of lung cancer exists in men who smoke, and the incidence of lung cancer in California has increased from 15/100,000 in 1950 to 26.7/100,000 in 1967. Automobiles are the largest source of carbon monoxide. The presence of CO in the blood reduces the availability of oxygen to the tissues in two ways: by direct combination with hemoglobin to reduce the amount of hemoglobin available to carry oxygen, and by preventing the release of some of the oxygen at the low oxygen partial pressure present in body tissues. It is believed that long-term exposure to CO may contribute to chronic disease. Missile fuels, explosives, cigarettes, and agricultural wastes liberate nitrogen oxides. Long exposure to 50 ppm nitrogen dioxide has caused inflammatory changes in the lungs, and higher concentrations have been fatal. Sulfur oxides come from fuel oil combustion, petroleum refining, and from the chemical and metallurgical industries. Hydrogen sulfide is produced by bacterial action on sewage effluents containing large amounts of sulfur compounds, and it can cause eye irritation and sensory loss. The constituents present in particulate matter include lead, beryllium, carbon, other metals, and organic particulates. Their sources and effects on human health are also discussed.

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